THE
ELECTRICAL REVIEW

Volume CXXVI. No. 3264

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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVI. No. 3264 JUNE 14, 1940 Price SIXPENCE

Restriction of Supplies

Interpretation of the New Order

ON page 638 of this issue we give particulars of the Limitation of Supplies (Miscellaneous) Order, 1940, made by the Board of Trade. The objects of this Order are to give a partial indication to the public of the classes of goods in which they are expected to economise, and to thus release plant, material and labour urgently required for war and export purposes.

It provides that a number of classes of commodities shall be "controlled" goods and that only those who are licensed to do so may manufacture or dispose of them for re-sale. The retailer who is not engaged in manufacturing or wholesaling is not required to register with the Board of Trade; his purchases of controlled goods will be restricted by the suppliers. Moreover, small manufacturers (*i.e.*, those whose sales of controlled goods of any class —there are seventeen classes—have not exceeded £250 in any one month during the past year) are not affected by the Order. All other suppliers of the goods scheduled must be licensed or will be prohibited in future from carrying on business in controlled goods.

The question of the position of new businesses has been raised with the Board, and we are informed that each such case will have to be specially considered on its merits. Broadly speaking, firms manufacturing solely for the home market will not receive such favourable consideration as those whose business extends into the export trade.

Extent of Reduction

The Order lists a number of classes of commodities including many electrical appliances. It is estimated that the total retail value of these goods in 1939 was about £250 million. A similar Order made in April, dealing mainly with clothing, covered goods valued at £100 million. Supplies are restricted during the next six months to two-thirds of the value of similar goods sold during the six months ended November 30th, 1939. It will be observed that the employment of *value* as a basis makes the actual restriction much greater than a third, for the prices of practically all the commodities listed have risen since last November. Lighting fittings, one of the items scheduled, may be quoted as an example. We published last week a notice from the Electric Light Fittings Association stating that the increase on pre-war prices of ornamental and decorative fittings was to be 20 per cent. from June 10th (it was already 15 per cent.).

But it also has to be remembered that the shortage of material supplies and the falling-off in demand have made considerable reductions in many branches of business. It is thus not very easy to assess the actual effect of the Order upon the quantity of goods which will be available to the public. It would seem probable, however, that the Order will have an adverse influence upon the already hard-hit domestic appliance section of our industry, and it is to be hoped that the Government will see that the surplus plant and labour of this section is rapidly absorbed in the production of supplies essential to the prosecution of the war.

The Board of Trade admits that the Order is likely to bear hardly upon many individuals, but these are asked to accept it as a contribution to the winning of the war. It is possible, too, that they will be able to engage in Service contracts or export trade which frees them from liability to be registered.

A Matter of Urgency

We hope that the details of the Order which we give will make the procedure plain. It must be emphasised that time in short; all applications for registration have to be in the hands of the Board of Trade by June 20th, but first the necessary forms have to be obtained. Applicants are advised to disclose all trading names, and it would be helpful if they sent in a sample of their letter heading where that is a guide to the nature of their business. There will inevitably be a number of questions raised by concerns who are (or think they may be) liable to registration. The Board of Trade asks people to apply for registration first and then ask their questions.

As it is probable that the Order will cover something like a hundred thousand firms, the Board is naturally apprehensive of the latent possibilities in the way of inquiries. It therefore urges applicants to consult their trade associations in the first place, or their trade papers, to whom all future decisions regarding the liability of goods to control will be sent.

As a final word we repeat the Board's advice: "When in doubt apply for registration!"

Less Copper

THE drastic reduction of copper and copper alloy supplies by the Controller of Non-Ferrous Metals will have an even greater effect upon the fittings and appliances sections of the industry. As from June 6th supplies have been cut almost entirely for ornamental lighting fittings, accessories and appliances except for export and Government orders. The use of substitutes is advocated where possible, but in many cases only another metal could be employed, which does not ease the situation. Synthetic resin substitutes are possible in some directions, and even glass might be used occasionally. Supplies for water heaters, wash-boilers, washing machines, lampholders and conduit bushes, &c., are cut to 25 per cent. for non-export and non-Government work. In view of the shortage we consider that it would be very helpful if Service departments would accept substitutes, where copper is ordinarily used, in all possible instances.

Value of Trade Papers

THE Board of Trade, in the operation of the Limitation of Supplies Order, recognises the service which the trade papers are able to perform within their specialist spheres of influence. But this is not the first instance in which the Board has called upon the trade Press for its assistance and by doing so has at once demonstrated the Board's appreciation of the close touch which that Press has with its readers and saved itself a great deal of unnecessary trouble. We would like to see the example of the Board followed by other Government Departments, some of whom have not yet realised the difference between trade papers and the popular Press. Another important consideration is the saving of paper that can be made by using the trade papers instead of thousands of circulars.

The Senior Class

WHILE the new names in the recent list of nominations for the next I.E.E. Council indicate that there is no dearth of suitable men for directing the Institution's policy, satisfaction is tempered by a tendency once more revealed in the last annual report. The class of Member has for some years past formed, numerically, a declining percentage of the total. The Council is drawn mainly and vice-presidents entirely from this class, which also controls entry to the Institution. There should be as much talent as possible available for choice in filling vacancies on the Council, especially in times like these, and it is a criticism of Associate Members that the losses that occur each year in the ranks of the Members, which in the course of Nature are disproportionately high, are not made good more quickly. The relative decrease is only slight, but in any case it hardly represents the true position that M.I.E.E. qualifications should be claimed by hardly more than a tenth of the membership.

Gas Turbines

SINCE it requires no water, occupies little space and can be started quickly, the gas turbine seems to have possibilities as a means of providing emergency supplies of electricity. The 4,000-kW 3,000-RPM set shown at the Swiss National Exhibition last year has now been installed, *Swiss Technics* states, in a bomb-proof cave at Neuchâtel from which it feeds into the town network. Actually the turbine produces four times the equivalent horse power, the difference, 12,000 kW, being absorbed in compressing the air fed to the combustion chamber to about 60 lb. per sq. in. About four times the amount of air necessary for combustion is employed in order to keep the temperature of the exhaust gases below 2,800 deg. F., which available materials can withstand. If just the right quantity of air were used the temperature would reach 8,132 deg. giving maximum efficiency, but this would be much more than the turbine blades would stand without growth. As things are, 18 per cent. thermal efficiency is said to be attained with the simplest design increasing to a maximum of 30 per cent. when combustion air is preheated by exhaust gases and the power gases are heated intermediately. In the United States at the lower efficiency the gas turbine has been found to compete with the Diesel engine for industrial blowing plant, since suitable oil fuel can be had for half the cost of Diesel oil. Future developments depend upon the production of metals capable of withstanding higher temperatures, for which the engineer awaits the results of the metallurgist's researches.

Registration

MANY electrical engineers, as our correspondence files bear witness, have been anxious as to whether their experience is being used to the best advantage in helping to win the war. Doubts will be set at rest by the request made by the Minister of Labour and National Service to the professional organisations to send further forms for completion by those of their members who were not enrolled in the voluntary register last year. While these forms are required immediately for record, Mr. Bevin states that men engaged on work of national importance should stay where they are until called upon to undertake even more urgent work. Any decisions of this kind would presumably be made effective after consultation with the I.E.E. and similar bodies. Non-members of the Institution should apply direct to the Ministry.

"Box Numbers"

ADVERTISERS of vacant situations no doubt often have good reasons for veiling their identities beneath a "box number," but it is a practice which has always had a deterrent effect upon would-be applicants. It is most awkward for a man to discover that he has applied for a job with the firm which is already employing him, particularly if he mentions that he wants a change because his present employers are unsatisfactory people. So far as advertisements in this journal are concerned, we offer the safeguard of undertaking not to forward letters to firms named by the applicants. The Association of Supervising Electrical Engineers gets over it in another way. It will forward full particulars of a member's qualifications and experience to a " box number " advertiser without disclosing the member's name. But this, we imagine, has to be done with care, for even without the name a man might be identifiable from his credentials.

London's Trolley-buses

ON Sunday the London Passenger Transport Board reached the end of the work of changing from trams to trolley-buses which was in hand at the beginning of the war, and no further conversion is likely until after the cessation of hostilities. The final stage covered two routes in the East End and added 147 to the Board's fleet of trolley-buses, which now number 1,671. North of the Thames there remain only the Kingsway Subway and Embankment trams. To the general public the change has meant a more comfortable and less noisy mode of travel but, more important, it is extremely doubtful whether they would have been given such a good service if the Board had chosen the other alternative—motor-buses—as has been done in a number of other towns. In the phase which the war is now entering upon the public may have even more reason to be thankful for the foresight of the Board's advisers in this matter.

Rates and Charges

THE Belfast Electricity Committee decided in January that £11,000 of the surplus profits of the electricity undertaking should be contributed to the relief of rates for the year ending March 31st, 1941. The contribution was to be contingent upon funds being available. Last week the Belfast Corporation decided that electricity charges should be raised by 10 per cent. It is to be presumed from this that funds will not be available for rate relief; we would not like to think that this item was taken into account in the raising of the price of electricity.

INFLUENCE OF LOAD FACTOR

Relationship Between Load Factor and the Size, Type and Operation of Major Power Station Plant

AN article dealing with the influence of load factor on various aspects of generating plant would, to-day, be misleading if it were not written with the national electricity supply in mind, for one of the underlying functions of the grid is to secure the highest practical load factor for the most efficient plant on the system. The resulting allocation of load in accordance with cost efficiency, then, means that national control is in evidence more in the case of stations of those undertakings with small loads.

Some of the influences of national control may be seen from the following examples. Comparison between the undertaking and total load-duration curves of a Group B station in London, with 90 MW of plant and operating on a two-shift basis, shows 38 and 78 MW undertaking and total maximum demands, and that for 1,000, 4,000 and 6,000 hours the loads were about 21 and 40, 13 and 20, and 6 and nil MW, respectively. A Group A station with 90 MW of plant, running five days a week as a three-shift station and two days on two shifts ran in 1938, 1939, and January, 1940, station and running load factors of 36.93 and 38.35, 39.5 and 45.9, and 40.8 and 43.7 per cent., respectively. The accompanying daily load curve, fig. 1, for another Group A station, 141.6 MW, shows the lack of relationship between the undertaking load and the total load, the latter, with its big, sudden rises and falls, not having the same ease of expansion as the undertaking load.

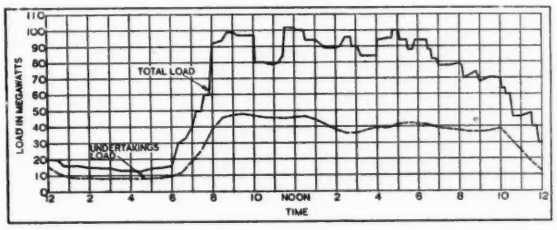


Fig. 1.—These daily load curves for 141.6-MW Group A station show the lack of relationship between the undertaking and total loads

It is vitally necessary first to grasp the real and full significance of load factor, because it is so easy to think of it merely as a numerical relationship between the size and output of the plant. In pre-grid days simple load factors were, generally speaking, low, and loads were (and still are) a good deal lower in the summer than in the winter. Since the stations generally contained a variety of plant, ranging from very old sets of small size and low steam conditions to comparatively large and efficient modern sets it was possible to meet the summer loads on the newer plant only.

For this reason station thermal efficiencies were sometimes higher in the summer months than during the winter, unless the summer load became so low that even the modern set could not be called upon for a reasonable proportion of its rated output.

A few supply undertakings found it desirable to develop new power station sites often at considerable distances from the original stations feeding the system, but in nearly every case it was found convenient to interconnect the stations, thus retaining the convenience of the feeders already connected to the older station. Such interconnection was practically equivalent to the addition of new plant on the existing site, and as far as possible the base load was transported to the new plant. The price of coal was rarely sufficiently in favour of the older station to permit it to carry any of the base load.

Whilst the load factor of the undertaking load, on both a monthly and yearly basis, showed only a small improvement due to development of the undertaking, the load factor for the new station was, generally speaking, greatly improved at the expense of the old station. With the base load of the system at the disposal of the newer stations, their simple load factors and running load factors were greatly improved, and very high plant load factors could be achieved, so that the total steam produced in the boiler house was used to maximum advantage in the turbines.

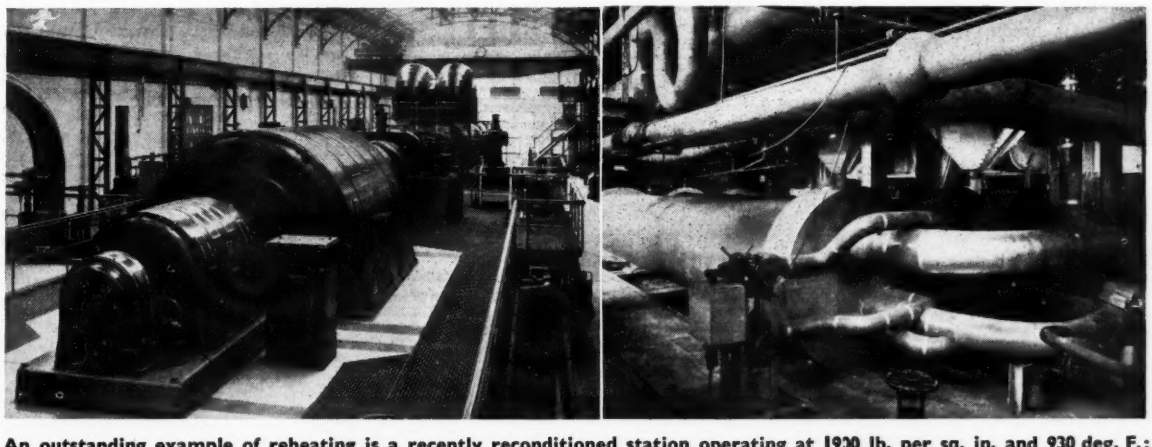
The latter point illustrates the great importance of high plant load factor. Since these newer stations were in commission continuously and often had night loads sufficient to avoid banking more than a small percentage of boiler plant, the aggregate banking losses in the boiler house were low and the average boiler efficiences were high, whereas in the older station this state of affairs was reversed. It is important to remember, however, that this method of using the older station did result in the lowest aggregate coal cost for producing the total energy required to feed the system, in spite of its adverse effect on the efficiency of the older station.

Interconnection of a complete area permits considerable further control of the plant load factor in particular than was possible when, say, only two stations were interconnected. However much the size and efficiency of sets in a single station may vary, they can be looked on as individual generating units, each with a characteristic coal cost per kWh, which is a product of thermal efficiency and cost of coal at the particular station. This permits allocation of the base load to individual sets in order of merit (coal cost per kWh), and because the system load is very large compared with the output of even the largest sets on the system, high load is ensured for the set as soon as it is on the bars, limited only by its ability to pick up the load from the system after the connection is made. Thus, high plant load factor and high average turbine-room operating factors are ensured.

Conditions in the boiler houses are somewhat different, since it may take anything up to an hour to bring a boiler up from the banked condition and three or four hours from cold.

Perhaps a good way to create the right outlook on load factor is to consider its effect on the costs of a 100-MW station costing £1.5 million with capital charges at 15 per cent. per annum. At 50 per cent. load factor the capital charges per kWh are 0.12d., and at 25 per cent. 0.24d.

Estimated operating costs for a large new Midlands station (300 MW) with the same conditions at 20 per cent. and 60 per



An outstanding example of reheating is a recently reconditioned station operating at 1930 lb. per sq. in. and 930 deg. F.; the turbo-alternator set and drums of one of the Loeffler boilers

cent. load factors are 0.1729d. and 0.1260d. per kWh. An increase of 0.01d. per kWh in the capital charges means an extra cost of £1,000,000 during the life of such a station at the higher load factor.

We have heard a good deal about the "fallacy" of load factor because of the different possible interpretations; it is true that although a factor may be good numerically it may be obtained with plant operating at certain periods at the maximum and less efficient rating and at others when there are deep valleys in the load curve and the plant is again working inefficiently. It seems probable, then, that the shape of the load curve may have a greater significance than the

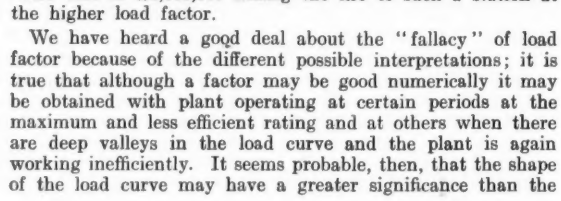


Fig. 2.—The load curve shape may have a greater significance than the actual numerical value of load factor; two extreme and hypothetical cases

actual numerical value of load factor. This may be illustrated by the two extreme and hypothetical cases in fig. 2. The undulating curve A could be styled as ideal, and although representing the same load-factor figure of 60 per cent. the curve B indicates much better economic conditions, especially as it could be interpreted as a 100 per cent. load factor, with a short-period overload.

To take this argument a little further, the all-important slope of the Willans line, which represents the rate of change of heat consumption with load factor, depends not only on the load factor, but also on the shape of the daily load curve which controls operation, *i.e.*, starting-up and shutting-down, and therefore stand-by losses. It is logical, then, to state that an annual load-factor figure is misleading, and this supports a belief that the shorter the basic time interval the nearer the load curve implies what load-factor is supposed to mean. This deduction, we think, is borne out by the now familiar average monthly load factor.

The falling of thermal efficiency with a rise of load factor, or vice versa, is sometimes regarded as an anomaly, but it is easy to see from the foregoing that different curve shapes could produce all sorts of such "inconsistencies," although a likely explanation in some cases appears to be, to the same end, an upsetting of the conditions by a change of plant capacity. Such considerations support the idea of the load-factor correction curve* as a guide in estimating the probable thermal efficiency from the likely operating conditions and the load-factor of a projected station. The curve shows load-factor correction plotted against annual running load factor and is compiled from the actual performance figures of a large number of stations. The correction figure is multiplied by the "test efficiency" and it varies from about 0.75 to 0.95 for 20 and 80 per cent. load-factors. A "basic efficiency" deducted from the station terminal conditions and multiplied by the boiler and turbine efficiencies results in the "test efficiency." The difference between the "test efficiency" and actual efficiency figures is accounted for by the shape of the load curve.

Choice of Plant Size

The national-supply influence is probably most marked in connection with the choice of plant size, for the broader field of operation has permitted a measure of standardisation without sacrificing that flexibility of plant control with regard to the load curve which so greatly influences the plant size. Such standardisation is evidenced in the vastly greater proportion of 30-MW sets that has been installed in the past few years. To create the correct mental picture in this connection it seems necessary to draw a line of demarcation between those many stations which represent the bulk of the supply throughout the country, and the few very large ones which are exceptional in that they are situated in very dense load centres and thus, by the very nature and density of the load, have similar plant and are operated in a similar manner to stations under independent control. It seems natural then that such stations outside the "field of standardisation" should afford suitable scope for a degree of the pioneering work so necessary for technical progress.

But to revert to the greater field, it seems that experience is now dictating the choice of the 30-MW set. In a few cases there is enough night-load to justify the 50-MW set, but otherwise the "thirty" is winning mainly on the score of flexibility, for the difference in efficiency—type for type—between the "fifty" and the "thirty" is really very small, although the backing of larger boilers makes a considerable difference. The load curve alone—not forgetting the broader national aspect—is ousting smaller sets than these, although in some cases engine-room size limitations are sufficiently good reason for a "twenty." The choice of the 30-MW set is bound up with the idea of 120 MW (four "thirties") being a good all-round station size. Indeed it now seems unlikely that there will be any new station of more than 150 MW for a long time. This may sound somewhat retrogressive, but it is necessary to consider "outside influences." Fire hazard in connection with switchgear led to an outlook which demanded separation of the station components, and air-raid precautions have proved to be a sound support for the change of outlook. And after all, with national interconnection, there is not much difference between what are virtually two stations on one site and two "independent" stations on separate sites.

In case it should be thought that we have dealt too strongly with the national aspect, we emphasise that the first consideration in the choice of plant size must be the daily load curve, and we agree that with a night load much below 40 MW a 50-MW set would not generally be an economical proposition. But nowadays it is often a case of the load fitting the station rather than the station fitting the load, and in either case the choice must result from consideration of the magnitude, increment and characteristics of the load. An excellent picture of to-day's control, depicting flexibility of the plant with regard to size in relation to the load curve, is given by fig. 3, which shows an actual day's load curve for a 540-MW base- and peak-load station, together with the corresponding operation curves for both boiler and generation plant. A sound general guiding rule for a station generating plant would appear to be that the maximum load on the station should equal the sum of the m.c.r.'s. of all the sets minus the m.c.r. of the largest set, and there should be at least sufficient running reserve on the bars to avoid load being dropped in losing the set.

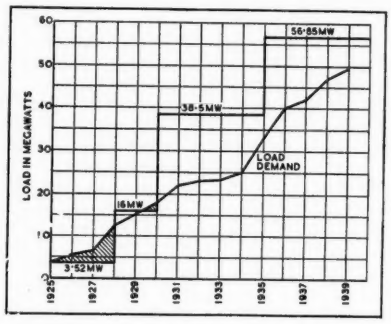


Fig. 4.—Private-generation load and plant-capacity curves showing a very rapid load increase after each increase of generating plant and a high load factor, characteristic of the conditions which have to be met in newsprint production

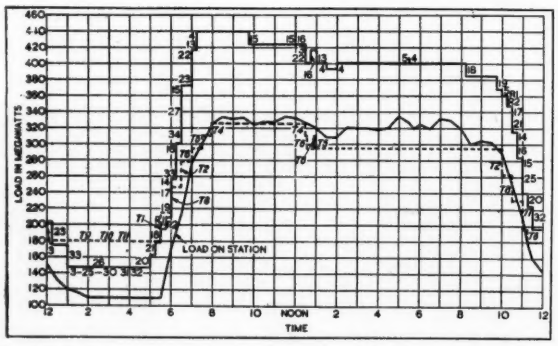


Fig. 3.—An actual day's load and running-plant curves for a 540-MW base- and peak-load station

Turbine plant: 75-MW sets T9, T10, T11 and T12; 40-MW sets T1, T2, T7 and T8; 20-MW sets T3, T4, T5 and T6. Boiler plant: 256,000 lb./hr. units 23 to 34 inc. 135,000 lb./hr. units 13 to 22 inc.; 80,000 lb./hr. units 7 to 12 inc.; 68,000 lb./hr. units 1 to 6 inc. and R1 and R2; 40,000 lb./hr. units R3 and R4.

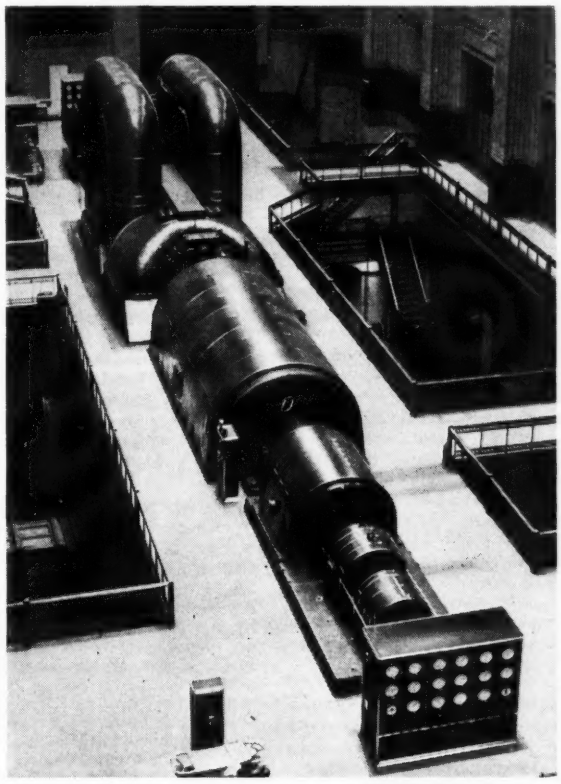
It is more difficult to talk of boiler plant in relation to load factors because normally boiler plant is not assessed when calculating or estimating plant load factor. In the light of the fact that boiler plant is rather more expensive and produces the greater operation difficulties, this is, to say the least, a little odd. We see no reason why there could not be a boiler-plant load factor calculated in terms of steam or electricity output, and if the handling of two station load factors should prove unwieldy, could we not have a composite load factor which would express a relationship between the boiler and turbine plant? But all this is linked up with considerations of boiler availa-

*Sir Leonard Pearce, D.Sc., Thomas Hawksley lecture to Institution of Mechanical Engineers.

bility, and in recent years the ratio of boiler plant to turbine plant capacity has tended to increase to facilitate maintenance. Incidentally, this is an expensive way of achieving high steaming availability of the boiler room as a whole, and more attention is being given to the fitting of devices to improve the availability of individual boilers.

There has been a tendency towards larger boilers, and in the United States it has led in some cases to a one-to-one boiler-turbine ratio. We should say that such an extreme is unlikely to become general practice, and certainly not in this country, where the tendency towards even two boilers per turbine can hardly yet be called the rule. We feel, however, that the idea of three boilers in service to every four installed is liberal. Sometimes capacity is designed so that the normal rating is 50 per cent. of the maximum rating of the turbine, thus affording a reasonable measure of availability on a two-boiler-per-turbine basis. The 100-MW set now being installed in a large city station will require 850,000 lb. per hour of steam, which is to be met by two 440,000/550,000-lb.-per-hour boilers. In another case, to cater for a new 30-MW set in a peak-load station, three 150,000-lb.-per-hour boilers were projected, but because of space limitations set by the boiler-house column centres it is more likely that four 100,000-lb.-per-hour boilers will be actually installed. These instances represent what we believe to be sound practice with regard to flexibility in relation to the load curve for the two groups of stations visualised, and indicate an influence independent of load. The curves in fig. 3 show also the necessity for flexibility in fitting the boiler plant to the load.

We feel that a good note on which to conclude these size-of-plant considerations is the excellent scheme of base- and peak-load working visualised for a group of stations by a South-Eastern counties undertaking. No. 1 station has been completed with a 60-MW set for base load and two 30-MW sets for peak load. No. 2 station was to have been equipped with two 60-MW sets for base load, the 60-MW set in No. 1 station then being relegated to secondary base-load operation. The idea in mind for a third station later on was to revert to the one 60-MW and two 30-MW sets of the first station, so as to be able adequately to cope with the expanded peak load by that time.



One of our highest load-factor and efficiency stations is operating very successfully on the regenerative cycle; a 105,000-kW turbo-alternator

The Heat Cycle

A study of the influence of load factor on the choice of type of generating plant nowadays is resolved almost entirely into consideration of the heat cycle, and on this question it is more than ever necessary to look to that broader picture of national supply, bearing in mind the necessity of adhering to the principle of employing the proven for those stations representing the bulk of the supply, without shutting the door on reasonable pioneering work.

The immediate justification for improved cycles is higher thermal efficiency ,and it is the load factor influence—*i.e.*, the proportion of time in which maximum use of capital is made—which decides how far the cost of the plant can be increased in order to justify the higher thermal efficiency on an £ s. d. basis. A guiding rule is: Does the increase in efficiency more than account for the additional capital expenditure? The absolute cost of fuel also has a bearing on the cycle chosen, because the higher the fuel cost, as a proportion of the total cost of generation, the more essential is it to use the heat efficiently. From this point of view, then, the rising prices of fuel during the past few years have, in themselves, been a justification of the tendency towards the adoption of improved heat cycles.

Generally speaking, therefore, the higher the load factor the more probable is the justification of the improved heat cycle, and this supports our earlier contention that it is to the very large base-load stations that we should look for the pioneering work, most of which concerns the heat cycle, bearing in mind also the necessity of having the right kind of technical staff to get the best from such improvements.

It is beyond the purpose of this article to enter into the relative merits of the different cycles, but an eye must be kept on some of the more fundamental influences. The all-important heat-drop in the turbine, for instance, is increased by higher steam pressure and temperature, while the impossibility of increasing the temperature in proportion to the pressure plays into the hands of the generating-engineer's bugbear—moisture at the low-pressure end of the turbine. Reheating the steam before it has completed expansion has been a very successful means of permitting the use of higher pressures, but it is somewhat complicated and easily upset, so that, apart from its requirements of a high-load factor on the score of costs, a fairly constant load is necessary for smooth running. A 60 per cent. load factor seems to be a guiding figure for this cycle, particularly when coal is dear. For lower load factors than this, but probably not below those of the two-shift station, the simple regenerative cycle gives a good account of itself. On the other hand, it is hoped that the simple regenerative cycle with pressures and temperatures of the order of 1,350 lb. per sq. in. and 925 deg. F. will give successful results. An outstanding example of reheating is a recently reconditioned station operating at 1,900 lb. per sq. in. and 930 deg. F., with reheating at about 200 lb. per sq. in. between primary and condensing turbines. We look forward to the time when this station has been thoroughly tuned up, because an expected efficiency of over 30 per cent. has been mentioned. Compounding existing plant by the installation of a high-pressure set to exhaust against the normal steam mains pressure is a promising means of increasing heat-drop and therefore the efficiency of the station as a whole, but whether it is fundamentally cheaper than new plant depends on the operating pressure and condition of the existing turbine plant. For the bulk of the stations in this country 600 lb. per sq. in. appears to give very good all-round results, taking into consideration capital outlay, running costs, and flexibility of operation.

With very cheap fuel there may be a case for low-pressure heat cycles with boilers and turbines of simple design, but cheap fuel is unlikely to be plentiful again. If there is any choice between cooling towers and river- or sea-water circulation, the cooling tower has often given an economic vacuum of as good as 28.6 to 28.7 in Hg., and the slight loss in efficiency as compared with river or sea cooling has more than been offset by the greatly increased civil engineering costs connected with the latter. Often, of course, there is no choice in this matter.

Apart from steam conditions, the main considerations in the choice of boiler plant from the load factor point of view are the methods of firing and controls, although there have been contributions to higher efficiency in recent years by way of good boiler design, notably larger combustion chambers and water-cooled walls. The chain-grate stoker has a good all-round performance with reasonable flexibility and firing efficiency. Indeed, it has its claim to consideration for all schemes with both high- and low-load factors. The retort stoker, with its much heavier live fuel bed than the corresponding size of chain-grate stoker is believed to be more efficient and more flexible, particularly in meeting sudden increases of load. When considering operating flexibility, however, fuel characteristics play an important part. For instance, the maximum flexibility necessary with widely varying fuels in large boilers can only be given by pulverised-fuel firing. A saving of as much as £40,000 per annum has been

shown for a 300-MW high-load-factor Midlands station when using pulverised fuel, as against stoker firing.

With regard to the choice of boiler control, the load factor influence is much more speculative, because there are so many factors involved—mainly, we should say, fuel quality. If we narrow the issue to the load-curve shape, however, the question becomes clearer on the score of flexibility of control pointing to a very definite load-factor influence. In 1936 a 90-MW London station had a load factor of 41.8 per cent. and a thermal efficiency of 21.02 per cent. In 1938, as the result of a change in operation of the station from three-shift to two-shift, the load factor was reduced to as low as 23.0 per cent., but the efficiency fell to only 20.48 per cent. The explanation given for this very small reduction in efficiency for such a big load-factor drop is automatic boiler control in reducing the variations of gas temperature.

600 lb. per sq. in. appears to give the best all-round results: the boiler house of a large city station

We hope that we have succeeded in proving our contention that, in spite of any figures which superficially suggest the contrary, there can be no doubt that, from the broadest viewpoint, there is between load factor and efficiency a definite relationship which is fundamental to all public supply electricity generation development, although simple load factor applied to a single generating station does not now possess the significance it did when stations operated continuously on their individual undertaking loads. In the case of high-load-factor stations it is worth paying more for extra thermal efficiency, while greater consideration must be given to capital saving on plant which is to be idle for comparatively long periods of time, always remembering that the base load of to-day may be the peak load of ten years hence. In all instances, however, good economic balance is the goal, and we believe that for the majority of stations this is best obtained by the sacrifice, to some extent and in varying degrees, of thermal efficiency. It is possible to buy thermal efficiency too dearly, and there has been a race for the highest thermal efficiency among generation engineers for some years past. These two facts alone, however, do not justify accusations that thermal efficiency has been or is being paid for at too high a price. The answer can only be given truly by production costs, and it is a pity that such figures cannot enjoy the publicity given to thermal efficiency figures.

Private Generation

Because the conditions pertaining to ownership are so drastically different from those in the case of public supply, we have been quite unable to consider private generation stations in the terms of the subject of this article alongside public supply stations. For one thing, development over the past few years indicates that it is only a matter of time before the public supply undertakings take over many of the private-generation concerns as consumers. In a word, the production of electricity is of secondary or minor importance to the private-generation concern. Further, we have avoided in this article any discussion of public supply *versus* private generation. There are, however, cases where private generation appears for good reasons to be firmly established; for instance, where there is waste heat available for steam generation, such as in iron and steel works, and where considerable quantities of exhaust steam are required for process heating, such as in paper mills. In these cases load factor usually has a deciding influence, but from quite a different angle.

In a large group of iron and steel works 50 million kWh is generated per annum in a number of works stations, while 60 million kWh is taken from public supply. The works stations take the base load, and the peaks (mills) are taken by public supply. Further, the public supply is regarded as the stand-by to the system, and an overall result is that load factors of the works generation system are 64 per cent. for the full year and 82 per cent. for the working days. Under these conditions the choice of plant involves the simplest possible considerations, and the difference in outlook from public supply ownership can be gathered from the fact that although there was no thermal efficiency figure available we had no difficulty in ascertaining the production costs. For one station with coal firing only, 0.334d. per kWh covered *all* charges for a recent six months working.

In a large paper mill with private generation only from 55,750 kW of plant, an average maximum load of 47,800 kW is maintained throughout the week of 136 hours. Two 12,500-kW main sets are straight-condensing units, and the other three (15,000, 10,000, and 5,000 kW) are pass-out turbine sets, so that the choice of the plant rests very largely with the works production requirements. The load and plant-capacity curves, fig. 4, show a very rapid load increase after each increase of generating plant, and a high-load factor is characteristic of the conditions which have to be met in newsprint production. Generally speaking, then, the influence of load factor is nominal as affecting the size, type, and operation of the plant.

Another case of the influence of process steam is a small laundry where there is both public supply and private generation. The total quantity of process steam needed during a typical week was about 331,000 lb., and the power (machine-driving) requirements amounted to 2,500 kWh. The steam figure consists of about 129,000 lb. for the washing processes and 94,500 lb. for the private generating plant. The greater part of the steam taken by the generating plant (75,600 lb.) is used for the production of hot water for the laundry, by-passing the engine exhaust steam to a calorifier. The remainder of the steam taken by the engine (18,900 lb.) is, roughly, that component of the electricity used throughout the establishment which is generated privately.

We are greatly indebted to a number of engineers who have helped us in our investigations leading to this article, and we very much regret being unable to associate their names with this acknowledgment, but we have been asked not to indicate the stations referred to.

A.S.E.E. Annual Report

THE report for the year 1939-40 of the Association of Supervising Electrical Engineers records active work in many directions. Mr. J. R. Beard was succeeded as president by Mr. H. W. Swann, H.M. Senior Electrical Inspector of Factories. After a slackening-off, due to the outbreak of war, applications for membership have again showed a revival. The rules of the unemployment benefit scheme were revised and subscriptions increased for new entrants; the scheme operated very satisfactorily during the year. The amount paid out in sickness, distress and death benefits was 50 per cent. higher than in the previous year but applications under the health services scheme were fewer.

In the earlier part of the year there was a considerable increase in the number of cases of conditions of employment dealt with. Increases were obtained in individual cases but others had to be postponed on the outbreak of war. There was an increase in the number of members seeking advice in connection with inventions. More inquiries were received by the employment bureau and out of 40 vacancies notified 16 were filled by applicants through the Association. Reference is made to action taken on behalf of installation inspectors employed by local authorities and to an article in the ELECTRICAL REVIEW and subsequent correspondence which led to a suggestion that an Installation and Distribution Joint Board should be formed. War conditions have retarded this work. The Association's Electricity Supply (Utilisation) Committee is examining the organisation of the utilisation side which includes all positions occupied by technical engineers engaged in the distribution, installation and utilisation branch of the supply industry.

The report gives details of the lectures, visits, &c., arranged during the year, the Meetings Discussion Award and the W.E. Highfield Shield Competition. Dealing with the district organisation of the Association, the report states that a new branch was formed for the Kent area. The many other matters covered include reserved occupations (practically the whole of the membership is "reserved"), compulsory wiring regulations and registration (temporarily held up), the A.S.E.E. Guide to the I.E.E. Regulations, revision of the rules, salaries during sickness, the A.S.E.E. Register (operating in conjunction with the Central Register), members and military service, the increased cost of living and the Control of Employment Act.

TARIFF STANDARDISATION

Some Minor Points of American Practice

By G. V. Harrap, A.M.I.E.E., A.Am.I.E.E.

IN recent years there have been numerous articles and papers published on the subject of tariffs, and in the discussion of them the question of "tariff standardisation" has usually been broached. Some of the articles have themselves dealt with the subject; here then is another. This time, however, it is not proposed to deal with the form and figure of the tariff itself, nor is it intended to make any recommendations about the means by which standardisation should be attained. The purpose of the article is rather to bring into greater prominence the various adjuncts to the tariff, *per se*. By this is meant such items as discounts, coal clauses, power factor rebates, and the like.

It is well-nigh impossible to state the prevailing practice in this country with regard to these items. The size and method of application of the various deductions and additions to the basic tariff, as practised in this country, has never, so far as I am aware, been determined. In any case, each reader can compare the following data with those characteristics of tariffs with which he is familiar. These notes on practice in the United States should be of assistance in judging the possibilities of attaining "tariff standardisation" and similarity of subsidiary details in this country.

Discounts

In America the feeling is growing stronger that the 10 per cent. "prompt payment" discount, which has hitherto been conventional, is undesirable. Many undertakings have entirely abandoned discounts and have preferred to include the customary reduction as a permanent feature of the standing charge. Other undertakings, which have not felt justified in wholly abolishing discounts, have established a sliding scale in place of a rigid amount such as 10 per cent. An example of this type is to be found in New York, where the discount on the first $25 is 5 per cent., and 1 per cent. on the excess.

The purpose of a discount is to obtain voluntary payment of a large number of relatively small accounts whose collection by the usual methods would cost the undertaking more than the discount—hence one of the reasons for a higher "unit" charge with prepayment consumers, since these require the services of a collector. In the case of large consumers, it is felt in America that a 10 per cent. discount is greater than that necessary to secure prompt payment. Furthermore, if payment is overlooked by the consumer for a day or two and he is then denied the discount he feels aggrieved. This is because the penalty exacted is obviously inconsistent with the usefulness of the money during the period in question.

Minimum Charges

American undertakings, in the early days, made it an almost universal custom to impose a minimum charge of $1 a month for each lighting consumer. This minimum was often higher for power consumers. Modern practice favours annual rather than monthly charges, although with very large accounts any change will obviously have to take notice of consumer's own preferences.

As with this country, so in America the first major move in the direction of complete abolition of minimum charges has been made with the domestic consumer. In theory such abolition cannot be justified, since certain expenses continue whether the service is used or not. Many investigations have been made to ascertain the amount of these standing charges per consumer. For the domestic consumer with the average amount of equipment and diversity of use these costs do work out at approximately $1 a month. American undertakings feel that a minimum charge of the equivalent of 5s. per month is too small to justify the complications of accounting and the detrimental effect upon the goodwill of the consumer.

Submetering

As is common in this country, electricity undertakings in America often sell electricity at cheaper rates to apartment, flat and hotel keepers. These then resell to their tenants, usually by means of prepayment meters. This practice has been encouraged, and in certain American cities submetering companies have been organised to furnish, maintain and read submeters where they are not of the prepayment type. These submetering companies also render and collect accounts for the owners.

In recent years certain objectionable features of this practice have received attention. These include the lack of any supervision over the submetered services and the possibilities of discriminatory tariffs. In the case of hotel tenants, these are only transitory, but flat tenants have some permanence and under this arrangement of submetering companies these consumers are deprived of the service and selling contacts with the electricity undertaking.

Submetering has been hotly debated in a number of States, and in New Jersey the Public Service Commission (a body analogous to our Electricity Commission) sustained the refusal of the electricity undertaking to sell energy at cheap rates to the owner of an apartment house who desired to resell to his tenants [1]. This decision was upheld by the State Courts [2].

The case finally went to the Supreme Court which declined to uphold the appeal [3]. Similar decisions have been made by other Commissions [4].

Duplicate Supplies

Many American industrial undertakings have a number of branches within the area of one electricity undertaking. Some of these consumers have demanded that the accounts for these duplicate supplies should be combined so as to secure the advantages of quantity differentials in the tariffs applying to such supplies. The Public Service Commissions have generally held that there is no justification for such combination, since the cost to the electricity undertaking for the several services to one consumer is not materially different from that given to independent consumers similarly located [5].

The operating companies in America have a form of competition to meet which is not encountered in this country. In urban and rural areas certain industries such as mining can, and often do, erect a power station and run interconnecting lines to their various pitheads. There are not, in America, the same restrictions upon the use of overhead lines, or the monopoly of supply, which are operative here. It will be appreciated, therefore, that there is a tendency to use this feature as a bargaining factor. Even though it means the loss of load the consensus of opinion in America is now that these combined accounts are uneconomical and that the practice should be avoided.

Coal and Power-factor Clauses

The coal clauses operative in the United States are of a similar character to those in this country, but they have not found universal favour with Public Service Commissions. As reference to a previous article of the author's will show [6], each electricity undertaking has to submit its tariffs to these Commissions for approval before they can operate them. Therefore, if a change in price of coal occurs, involving an increase or decrease in the ultimate unit charge, such change cannot be legally made because it is not specifically a part of the schedule filed with the Commission. If the undertaking informs the Commission at the beginning of each month, and informs all consumers concerned, and publishes the change in every newspaper circulating within the area of supply, then some Commissions will agree that such a coal clause can be accepted as valid during the ensuing month.

It has, however, been held that coal clauses involve undesirable complications in retail, as distinct from wholesale, business and should therefore not be approved [7]. It has further been held that the contention of certain consumers that they are entitled to know in advance what their power will cost them, was reasonable. With varying costs of fuel, this ascertainment of exact future costs is impossible, and hence the coal clause has in some instances been disallowed [8]. Such a verdict, in view of the fact that no independent consumer operating his own plant could definitely forecast his power costs because of fluctuating demands for fuel, labour, repairs, &c., and their varying costs, is obviously illogical.

Power factor clauses are as common in America as they are in this country, but there is a growing tendency to favour the measurement of kVA in place of kWh and p.f.

Selection of Tariff

The above outline covers the special features of the tariffs in force in the United States. With regard to the tariffs themselves, a study of those mostly in use shows that the majority are of the block or the Hopkinson demand form, with various modifications and combinations. The bulk of the

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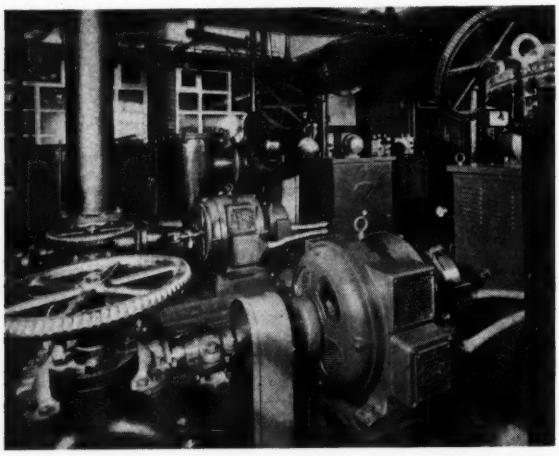
BLACKPOOL BATHS INSTALLATION

Pumping and Air-conditioning Plant

AN interesting series of motor installations has recently been completed by Crompton Parkinson, Ltd., at the Blackpool Corporation's Derby Baths. The building itself, which will seat 1,760 spectators round the main bath, has concealed floodlighting and a loudspeaker address system, while plenum plant for air conditioning is installed. The main pool holds nearly 500,000 gallons of sea water, which is being heated and cleaned by a continuous process of filtering. The whole of the pumping plant is arranged to ensure continuous operation and the pumps driven by Crompton Parkinson motors and the control gear have been duplicated.

A primary station situated on the promenade delivers sea water at 600 gallons per minute against a 70 ft. head to 120,000-gallon sludge tanks where the water is allowed to settle to remove impurities. These pumps are driven by vertical-spindle, totally enclosed, fan-cooled, 18 HP slip-ring motors. They are not self priming pumps and an injector primer is



Filter room pumps for the main bath, showing two 42-HP "Super-Silent" variable-speed Crompton Parkinson motors

fitted driven by a 1-HP motor. When this is done and the settled water pumped into the bathing pool, a certain amount is retained in the sludge tanks so that any settled impurities are transferred to the main sewers. This is done by a sludge pump driven by another totally enclosed vertical spindle motor of 6 HP.

There are two main paths for the water after the settling tank stage. It is pumped to roof tanks and also to the main filters. The roof tanks supply showers, slipper baths, &c., and the water for these purposes is pumped to the tanks through a filter, chlorine and other chemicals being added for coagulation purification. The chemical pump has a ¼-HP motor and the mechanical agitator which washes the filter is driven by a 3½-HP screen-protected squirrel-cage motor. The flow destined for the pool is dealt with by the continuous filtering process which completely changes the half a million gallons of water every three hours. The main filters are arranged in two banks of six, either of which can be taken out of service without interfering with the main process. Mechanically operated agitators driven *via* line shafts by 5-HP squirrel-cage, screen-protected motors wash the filters. The water then passes through an aerator which has another screen-protected squirrel-cage motor of 2½ HP. Before it flows into the pool the water is treated with chlorine and ammonia, while part of it is heated before rejoining the main flow into the pool. When the water is drawn from the pool certain chemicals are injected by a ¼-HP motor driven pump for purification. The water is then strained and passes into the main circulating pump which is driven by a 42-HP variable-speed, screen-protected, slip-ring motor.

The equipment for the learners' pool is similar but on a smaller scale, the main circulating pump being driven by a 3½-HP variable-speed, screen-protected, slip-ring motor. A sparge rail runs all round the pool from which a cascade of water can be projected, and a 10-HP variable-speed motor drives a booster pump for this purpose. A smaller motor drives the sparge rail pump for the learners' pool. A similar device is the rain spray, the pump in this case requiring a 4-HP squirrel-cage motor.

The air conditioning plenum plant is automatic. First the intake is washed, the washing pump being driven by a 4-HP screen-protected motor, and the air then passes through hot water pipes to warm it, the air temperature being controlled by an air pressure valve. Compressed air is supplied from a compressor driven by a ½-HP motor. The main intake fan has a 20-HP variable-speed slip-ring motor and the principal extractor fan is driven by similar motor of 8 HP. There are two additional extractor fans situated on the roof of the building and the motors driving them are of variable-speed type and are totally enclosed and weatherproof. These fans extract air from the basements and boiler house.

The boiler house has five low-pressure "Halco" boilers with six calorifiers, two for fresh water, two for sea water and two for central heating. Three more calorifiers heat the bathing pool water and the learners' pool. The boiler-room motor plant consists of two 1½-HP sump pump motors and one 1-HP, ½-hour-rated motor for the slag hoist. The hot sea and fresh water is circulated for slipper baths, &c., both pumps having ¾ HP motors, while the central heating circulating pump employs a 1 HP motor. This supplies 400 radiators. "B.V.C." vacuum cleaning plant is installed and its turbine requires a 10 HP motor. Push-button-operated electrical window opening is used, while an electric alarm level indicator is used in the pump room to determine the operation of the sludge pump. The 200-V single-phase lighting has an emergency "Keepalite" standby system and the auxiliary plant is duplicated throughout.

All the motors are Crompton Parkinson "Super-Silent," as a high degree of silence is obviously required. With the exception of the vertical-spindle motors they are all of the ring lubricated sleeve bearing type. The starters are fitted with three overload and no-volt releases complete with isolating switches and ammeters.

Tariff Standardisation (*Concluded from preceding page*)

domestic business is done under a block tariff, and the same form is used to a considerable extent for small power users, shops and offices. For large power consumers the demand rate is employed, together with some or all of the above-mentioned special clauses.

Many undertakings find it desirable to have alternative tariffs for all types of consumers, so that a choice may be made to suit individual uses. The availability of alternative tariffs for a particular class of service raises the question of the responsibility for the selection of the most advantageous one for each consumer's use. Consumers have sometimes demanded refunds when they have found that they could have obtained their electricity more cheaply by using an alternative tariff. The Public Service Commissions have generally held in such cases that where adequate publicity had been given to all the alternative tariffs it was not the duty of the undertaking, but rather of the consumer, to make the choice (9).

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Istanbul Lamp Factory

THE April *Journal* of the British Chamber of Commerce of Turkey reported that the construction of a factory for the production of electric lamps has been under consideration for some time past. It has been decided that the Istanbul Municipal Bank shall supply the necessary capital and that the sale of the lamps produced shall be undertaken by the Municipality.

ELECTRICITY IN CAKE MAKING

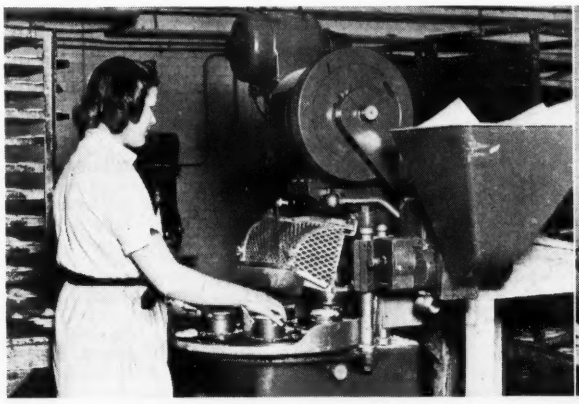
Conveying and Handling Equipment

HANDLING has been minimised by the use of electrical machinery at the Orchard Bakery belonging to Howell & Hall, Ltd., at Hayes, Middx., where confectionery of all kinds is produced. The first electrically operated process employed is that for the cleaning of fruit. This is undertaken by a machine in which an electrically driven pump passes water through the fruit and, besides washing out dust, &c., deposits heavy foreign bodies on a series of steps. Mixing of the ingredients is done by various machines according to the kind of cake, &c., being made. Dough is dealt with in a large Baker Perkins pan-type machine with a capacity of one sack of flour, while two machines (of the same make) of horizontal cylindrical construction are used for cakes, buns, &c. Sponge mixtures are prepared with the aid of two Ericsson whisks.

When thoroughly mixed, the dough passes through a dough breaker (Baker Perkins), which rolls it out into a thin sheet ready for cutting to required shapes. The dough for bread goes to a Melvin moulder and divider. Buns are prepared by means of two automatic moulding machines of different types (one Baker Perkins and the other a Humi-Star "Humidor") capable of turning out 10,000 an hour, while such things as fruit tarts and custard pies are handled by an Ericsson pie-making machine with an output of 2,000 an hour. The correct amount of mix for sponges is automatically weighed out by a Copeland depositor.

Baking is done by gas, but electricity is used to drive the 45-ft. long Baker Perkins travelling oven, which can handle 3,000 cakes or buns an hour. The motor drives the conveyor through reduction gears at a speed which can be regulated from 10 to 50 minutes to travel the length of the oven. The temperature of the oven, too, is controlled by electrical means, a compressor being used to increase the pressure of the gas up to 6 lb. per sq. inch, according to the degree of heat required.

In the special room for the preparation of the various cream and other fillings required, the electrical equipment consists of an emulsifier, cooling plant and a Kelvinator refrigerator. Decorating, weighing and wrapping slab cakes are done on a travelling band conveyor. Amplilux armoured glass lighting fittings give a high intensity illumination throughout the building and a fan heating installation is just being completed by Graham Smith & Co. The electrical work was carred out by Duncan Watson Electrical Engineers, Ltd., Handcock and Dykes acting as consulting electrical engineers.



Ericsson pie-making machine and Baker Perkins dough breaker at Howell & Hall's bakery

Electricity at the Paris Fair

By S. H. Kahn

IN spite of war, the electrical industry put up a very creditable showing at this year's Paris Fair (May 11th to 27th). It is, perhaps, to be regretted that the Société pour le Developpement des Applications de l'Electricité (known as APEL), which generally organises a display of industrial applications in the electrical section, did not do so this year. The result has been that many of the firms which would normally have been included in the electrical section have preferred to seek space elsewhere—in the food section, machinery section or industrial heating section—so that there was a certain scattering of what is usually united. The war, of course, somewhat reduced the number of firms exhibiting, as well as the importance of some of the displays, so that this scattered industrial effort made the electrical section seem even smaller than it really was.

As was only natural war conditions reduced the number of novelties to be seen, but this does not mean that they were non-existent. Domestic appliances showed little change, though Thermor displayed a small range with only two hotplates on the top instead of the usual three, the rear being occupied by a resistance which is placed directly under the enamelled top to enable dishes or foods to be kept warm. It also solves what has always been a problem in electric cooking in France by providing a means of simmering foods very slowly.

Another novelty was a new pocket lamp which is also suitable for use as a table lamp. Brought out under the name of "Skopeo," it has a case with a hinged cover, in which the lamp is placed. When this cover is lifted, the lamp lights up, being reflected out by the inside of the cover. The result is a more diffused light than is obtained with ordinary beam-type lights, which can be very suitable for seeing one's way in a blacked out street without creating too much light. When stood up on a table it throws a limited light, but quite sufficient for reading or working.

There was also a new electrical toy known as "Multimoteur." It comprises all the elements necessary for the construction of any industrial installations, including motors, generators, distribution or transmission substations and even mutators. The manufacturers explain that the installations possible with the parts permit engineers to try out arrangements for new constructions, and discover any possible weakness. As an example, their stand presented an installation comprising a mutator, converting the single-phase lighting current into three-phase which was then passed through a series of transformer substations, complete with oil switches.

Clin, whose principal line is woven resistances, have always presented small electric hotplates, and this year showed a new pattern using a woven resistance instead of the usual coiled type. In its favour, they claim that the woven resistance is both easier to make and to install than coils, and permits a much cheaper construction without loss of strength or value.

Some of the large industrial manufacturers were present, although they considered it rather a patriotic duty than a means of getting orders. Some of them, already overloaded with Government contracts for national defence, could not take an order if it were offered, so that their stands were an indication of their standing, rather than a display of novelties or manufactures. In the industrial machinery section, however, manufacturers of welding equipment showed some of their more or less usual types of machines. Soudure Autogene, Sarazin and Soudarc all had stands. In the same section Maurice Damien had an electro-plating installation, while in the food section, Bonnet, who have always been well to the fore in the applications of electricity to foods, have a small ice-cream freezer and distribution counter of a type familiar in the United States, but not yet seen in France.

On the whole, the Fair seemed, this year, to represent the French determination to carry on in spite of everything, and, as such, the electrical section made a worthy showing. In 1914 the Paris Fair was interrupted, to resume only in 1917, after three years of painful organisation. This year the Fair, like French industry, has carried on, on a smaller scale to be sure, but without a break.

HOME CONSUMPTION RESTRICTED

"Rationing" of Electrical Appliances

LAST week the Board of Trade issued the Limitation of Supplies (Miscellaneous) Order, 1940, which restricts supplies to the home market of a large number of articles commonly used but not regarded as essential. Seventeen classes of commodities are affected.

The Order provides for the registration of every person carrying on the business of supplying (a) any class of controlled goods in the manufacture of which he has carried out a process, or (b) any class of controlled goods to persons who buy for the purpose of selling them again. Retailers who sell goods to persons who do not buy for resale are not required to be registered. During the period from June 6th to November 30th, 1940, the aggregate of the controlled home supplies of each class is to be restricted by each registered person to a maximum of two-thirds of the corresponding aggregate for the six months ended November 30th, 1939, calculated by value, not quantity. The restriction does not necessarily apply to individual customers, nor does it preclude the supply of new customers.

Every controlled supplier, as defined above, is required to apply on forms issued by the Board of Trade for registration on or before June 20th. Forms are obtainable from Chambers of Commerce, trade associations and by personal application at the offices of H.M. Inspectors of Factories, or from the Industrial Supplies (Registers) Dept., Board of Trade, Fanum House, 66, Whitcomb Street, London, W.1. Every applicant is required to specify each class of controlled goods in respect of which he is a controlled supplier. Applicants will be informed as soon as possible whether or not their names have been entered on the Register, and a copy of the Register will be published and placed on sale at the earliest possible date. When it is issued forms will be sent to all registered persons on which to make the return required under the Order. A retailer who carries on a relatively trifling wholesale business may be exempted from the requirement to register as a wholesaler provided he raises the question when applying for registration.

Small Manufacturers and Wholesalers

A manufacturer who is not also a wholesaler is neither required to apply for registration nor to observe any of the other provisions of the Order, provided that his production of any class of controlled goods did not amount to more than £250 in value in any one month in the year ended May 31st, 1940, and does not amount to more than £167 in any month henceforth. The exemption applies equally whether or not the small manufacturer retails his product himself. But any retailer and any other person who carries on or has carried on the business of manufacturing any class of controlled goods in excess of the above figures is subject to the operation of the Order. He has to apply for registration and limit his sales within the class in question, including the goods which he does not himself manufacture.

All registered persons may supply without restriction (a) any class of controlled goods to any other person whose name is included on the Register for that class of goods, (b) goods required for the execution of contracts with Government Departments, (c) direct to overseas markets. Supplies to local authorities do not come under heading (b). Northern Ireland and the Isle of Man are not overseas markets; the Channel Islands and Eire are.

It is emphasised that the restriction to be made must be computed in respect of *each class* of goods. It may happen that suppliers registered in respect of one class are not registered in respect of another class or classes. When making his computation, therefore, the supplier must examine the Register to ascertain in respect of which class or classes of goods in which he deals each of his customers is (or is not) registered. The words "supply" and "supplied" are to be understood as referring to the physical act of supplying and not to the making of a contract under which goods will be subsequently supplied. Articles should be regarded as being "supplied" on the date on which they are dispatched to customers.

Method of Computation

Normally the value at which supplies are to be taken into account will represent the net sale prices on which the invoices to customers are based. It is suggested that registered persons will probably find it convenient to compute the value of their permitted home supply of controlled goods somewhat as follows: In respect of each class of goods—(a) Ascertain the total value as invoiced to customers from June 1st to November 30th, 1939. (b) Subtract from this the value of supplies which are unrestricted (to Government Departments, exports, &c.). (c) Subtract the amount of any discounts, commissions or allowances to buyers and any delivery charges applicable to the remaining supplies. (d) From the net total subtract one-third.

Manufacturers' agents, shipping houses or similar firms operating solely on commission will not be registered as suppliers. Firms which deal in controlled goods on their own account in addition to acting as agents for others must apply for registration. A manufacturer whose business in controlled goods consists solely of manufacturing on commission or performing a process on goods which do not become his property is not required to register. The person on whose behalf such work is done is required to register. The restrictions apply to imported goods and the importer of controlled goods who supplies them to other persons who buy for the purpose of selling them again is a wholesale dealer and is required to be registered. The retailer who is not engaged in manufacturing or wholesaling is not required to register; his supplies are liable to restriction by the registered suppliers.

Special arrangements are made in respect of cases where a registered person carries on two or more separate businesses under different names or styles and where goods pass from sellers to buyers associated with them in business.

The Order provides for the determination, in certain circumstances, of contracts for the supply of controlled goods entered into before the date of the Order, if difficulties arise.

Persons required to register who fail to do so before June 20th will be prohibited from carrying on business in respect of which they were required to make application for registration. Heavy penalties are provided for contravention of, or failure to comply with, the Order.

It is pointed out that the production of some of the goods covered by the Order is already restricted by materials control to a degree in excess of the limitation imposed by the Order. The maximum set on the amounts which may be supplied to the home market carries no implication that raw materials will be available to enable the maximum to be obtained. Moreover, the Order will have the effect of conserving stocks of finished goods in the hands of manufacturers and wholesalers and diverting them to foreign markets.

Restricted Goods

It is not necessary for us to reproduce the full schedule of goods placed under control. From it we have selected those items which concern the electrical industry; they are as follows:—

In Class 9: Fittings of the kind commonly used in interior lighting systems of the following descriptions: Brackets, pendants, candelabra and electroliers; lanterns; shades, bowls and reflectors; table and floor standards. Electric razors. Coffee percolators.

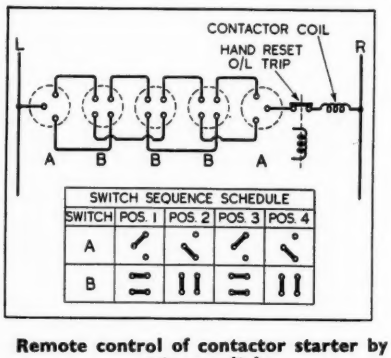
In Class 12: Exposure meters for photography.

In Class 13: Radio-gramophones (but not wireless receiving sets, sound amplification apparatus and loud speakers). Coin or disc-operated gaming machines. Toy dynamos and other mechanical toys.

In Class 17: Domestic plate washers; fans with motors not exceeding 1-10th HP; hair-waving and hair-drying machines; lawn mowers; domestic washers and wringers; domestic vacuum cleaners; refrigerators having a storage capacity not exceeding 12 cu. ft.; and electrical appliances of the kind commonly used for domestic purposes, the following: Toasters, irons, plate warmers and kettles.

Rotary Switching

IN our issue of May 31st (page 586) we published an article on "Rotary Switching" by Mr. R. W. J. Cockram, A.M.I.E.E. rotary switch enginner to Santon, Ltd. Included in the article was a diagram illustrating the arrangements for the remote control of a contactor starter from a number of points (fig. 2). Unfortunately the connections were incorrectly drawn and so the diagram is reproduced herewith in its proper form. The author maintained that remote control by rotary switches had advantages over the conventional push-button method, particularly the simplification of the wiring. In fig. 1 position 9 was incorrectly given as 6.



Remote control of contactor starter by rotary switch

I.M.E.A. Meeting

Four Resolutions

THE annual meeting of the Incorporated Municipal Electrical Association which was to have been held on May 30th but was postponed is now to be held on Thursday next, June 20th, at Grosvenor House, Park Lane, W.1, at 10.30 a.m.

After the presentation of the report and accounts, to which we made reference in our last issue, four resolutions will be moved. The first is by Mr. C. Cameron Kirby, engineer and manager, Alderley Edge and Wilmslow Electricity Board, and is as follows:—

"That the Central Electricity Board be urged as soon as practicable to offer an alternative to the present grid tariff, so that the annual kilowatt charge be based (say) on the average maximum demand of the four months of January, February, November and December, even if this should mean some alteration in the amount of the existing charge per kilowatt."

Mr. H. Wilson, electrical engineer, Ashford U.D.C., will move:

"That in view of the number of public electricity supply undertakings who are dependent on a single transmission line for their supply, and in view of the chance of interruption of such supply by storm, forced landing of aircraft, or bombing by enemy planes, and the unremunerative, and sometimes prohibitive cost of erecting a duplicate transmission line, the I.M.E.A. should approach the Electricity Commission and seek permission for such undertakings to be allowed to put in Diesel engine plant so that a reasonable proportion of their load can be dealt with by local generation."

Mr. R. Lee, chief electrical engineer and manager, St. Pancras, will move that:

"This meeting is of the opinion that the expenses of representatives attending meetings of the executive committee or sub-committees of Centres, at present paid by the local authorities whose members or officers are elected, are charges which ought to be borne proportionately by all members of the Association, and that the Council be instructed to propose an alteration of the bye-laws in order to meet such expenses."

Councillor G. W. Luck, chairman, Erith Electricity Committee, will move:

"That H.M. Government be informed that it is the opinion of this Association that, in the event of the reintroduction of fuel rationing, due regard should be paid to the value of electricity for household heating purposes, particularly when, owing to transport difficulties, supplies of solid fuel are not obtainable."

Copper Supplies

Reduction for Electrical Industry

THE Controller of Non-ferrous Metals has pointed out that owing to the very heavy demand for copper and copper alloys at the present time it is of the utmost urgency that the use of these materials for non-essential purposes shall be eliminated, and that their use for other purposes be reduced to the minimum. It is recognised that copper is an indispensable material for many electrical purposes, but there are certain applications of the metal and its alloys for which substitute materials could be employed.

In order that more definite guidance may be given in this matter the employment of copper and copper alloys in the production of the articles mentioned below will in future be restricted, except for minor parts for which no substitute can be employed and for the plating or brazing of steel parts where this is necessary. The restriction applies to all goods, except those manufactured for export or to Ministry of Supply, War Office, Admiralty or Air Ministry orders.

As from June 6th until further notice no more licences will be granted, except in very special circumstances, for copper or copper alloys for the manufacture of the following articles:—Ornamental lighting fittings of all types, including table and standard lamps, lighting reflectors, shades, galleries and shade carriers, tumbler switch covers; switch, socket and bell-push plates; bodies and lids of electric kettles, saucepans, coffee percolators, waffle plates and similar cooking and portable water heating appliances; reflectors, guards and ornamental parts of electric radiators and bowl fires; reflectors of car, cycle and hand lamps and torches; fan blades and guards; and conduit tubing.

The weight of copper and copper alloys to be used by any manufacturer in the production of the following articles will be determined as follows:—Raw material licences will be granted for the four months commencing June 1st, 1940, to an extent not exceeding 25 per cent. of the tonnage used by the manufacturer during the same period in 1939 for home civil orders only:—Electric water heaters of all types; washboilers and washing machines (except motors); lampholders (except inserts, terminals and contacts); and conduit bushes, connectors and fittings of all types.

Whenever copper or copper alloy products are required for the manufacture of any of the articles mentioned above for Service orders, a statement to this effect must be made by manufacturers to their suppliers and be included by the latter in their applications for licences to purchase the necessary raw materials.

Particular attention is drawn to the vital necessity at the present time for the exercise of special care in the salvage and repair of all types of apparatus and appliances in order that new replacements may be eliminated wherever possible. If repair cannot be effected the materials scrapped should be suitably graded and disposed of without delay.

All firms adhering to the above scheme must quote the symbol "N.F.E." when ordering from their suppliers, who must in turn quote the same symbol on the schedules which they submit to the Non-Ferrous Metals Control. The use of this symbol by any firm is to be regarded as an undertaking that the conditions set out above are being fully observed. No application for metal will be considered unless the symbol is quoted.

The Export Drive

Sectional Groups

ON account of the large variety of electrical products that come within the scope of the two main Export Committees set up in the electrical industry—the Electrical Machinery Export Committee and the Electrical Goods and Apparatus Export Committee—it is apparent that Sectional Export Groups must be established to deal with the domestic problems on export appertaining to each class of goods.

Consequently, the following Sectional Export Groups have now been formed under the ægis of the Electrical Machinery Export Committee, and others are in course of formation.

Turbines, covering steam turbines, turbine reduction gear, turbine-driven generators, condensers, turbo-blowers and compressors.

Electric traction apparatus.

AC and DC motors and generators.

Transformers.

Switchgear (heavy and medium).

The Secretary of the Electrical Machinery Export Committee and of these Sectional Export Groups is Mr. A. G. Seaman, M.I.E.E., 36, Kingsway, London, W.C.2, and it is open to all bona fide manufacturers in Great Britain who export or intend to export these products of their manufacture to apply to him for membership of the appropriate Sectional Group or Groups.

In a similar way, the following Sectional Export Groups have so far been established under the ægis of the Electrical Goods and Apparatus Export Committee:—

(i) Heating, Cooking and Domestic Electrical Appliances Sectional Export Group, covering products generally listed in Schedule 5 of the Fair Trading Policy (excluding water heaters—see below).

(ii) Electrical Wiring Accessories Sectional Export Group covering the wiring accessories broadly listed in Schedule 1 of the Fair Trading Policy.

(iii) Fans and Fractional-HP Motors Sectional Export Group covering (a) fans (table and ceiling types) and (b) fractional-HP motors.

(iv) Electric Water Heaters and Temperature Control Apparatus Sectional Export Group covering (a) Electric water heaters (storage and immersion types) and (b) temperature control apparatus (*e.g.*, thermostats, mercury switches).

(v) Insulators and Insulations Sectional Export Group covering (a) Ceramics and vitreous products; (b) fabrics, including varnished cloth and tape, and other tapes; (c) mica and micanite; (d) press-board, vulcanised fibre and other fibrous materials of a similar nature; (e) varnishes and compounds; and (f) synthetic resin treated material, including laminated products.

(vi) Conduit Fittings Sectional Export Group covering products as broadly defined in Schedule 8 of the Fair Trading Policy.

The Secretary of the Electrical Goods and Apparatus Export Committee and of the Sectional Export Groups (i) to (vi) above is Mr. Felix A. Rogers, 36, Kingsway, London, W.C.2, and it is open to all bona fide manufacturers in Great Britain who export or intend to export these products of their manufacture to apply to him for membership of the appropriate Sectional Group or Groups.

Other similar Groups under the heading of "Electrical Goods and Apparatus" are in process of formation and will be announced later.

I.E.E. Announcements.—The Committee of the Western Centre of the Institution of Electrical Engineers has decided to cancel the summer meeting which had been arranged to be held at Chepstow on June 22nd. The annual general meeting of the Centre will now be held on June 24th at the South Wales Institute of Engineers, Park Place, Cardiff, at 3 p.m.

In view of the present war situation, the North Midland Centre of the I.E.E. has postponed the Benevolent Fund golf competition which had been arranged for June 20th. It is proposed to hold donations and entrance fees in suspense until the possibility of holding the competition later in the summer can be considered.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

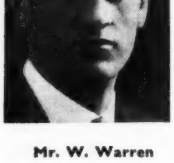
AT last week's meeting of the Executive Council of the Association of Supervising Electrical Engineers, **Mr. F. W. Smith** (Rashleigh, Phipps & Co.) was elected chairman for the ensuing year. **Mr. S. G. Christian** (installation engineer, Poplar Borough Council) was elected vice-chairman and **Mr. C. W. Bullock** (St. Helens Cable & Rubber Co.) hon. treasurer.

Mr. F. W. Smith

Mr. J. H. Taylor, secretary and chief accountant to the Cambridge Electric Supply Co., Ltd., has retired after nearly fifty years 'service with the company. **Mr. W. J. Tabraham,** who has been with the company for the past thirty-nine years, is succeeding him.

Prof. S. R. Milner, F.R.S., is retiring from the chair of physics in the University of Sheffield in September next. In his earlier research activities Prof. Milner was associated with Prof. Chattock on the thermal conductivity of water, while he has also been concerned with the electric discharge in mercury vapour and with the mechanism of the spark discharge, involving the analysis of lines in a rotating mirror and the characteristics of the oscillatory spark. More recently his work has been connected with the properties of the electromagnetic field in four dimensions.

Mr. W. Warren, whose appointment as deputy borough electrical engineer at Derby, has now been confirmed by the Corporation, received his technical education at the Royal Technical College, Glasgow, and the Regent Street Polytechnic, London, and his electrical training with Siemens Bros. Marine Department in Glasgow. He served a mechanical apprenticeship with Alley & MacLellan. From 1914 to 1918 he served with the 29th and 52nd Divisional Royal Engineers in France, Gallipoli, Egypt and Palestine. He joined the Glasgow Corporation Electricity Department in 1920 as a draughtsman, and in the following year was appointed assistant engineer at the Taylors Lane power station of the Northmet Power Co. In 1923 he went to Islington as assistant engineer, and in 1924 joined the Hammersmith Borough Council Electricity Department, first as maintenance engineer and later technical assistant. He remained there until 1926, when, after six months as engineer in the Field Department of International Combustion, Ltd., he went to Derby. Mr. Warren is an Associate Member of the Institutions of Electrical and Mechanical Engineers.



Mr. W. Warren

Mr. H. T. Collinswood and **Mr. K. W. Atchley** have been elected directors of the Harland Engineering Co., Ltd.

The services of **Mr. C. W. Saddington,** electrical engineer and manager to Oban Corporation, have been lent to the Grampian Electricity Supply Co.

Mr. J. A. Langridge, meter superintendent with St. Marylebone Borough Council Electricity Department, has retired. It is recommended that **Mr. W. F. Baker,** assistant meter superintendent, shall be appointed to succeed him.

Mr. W. Baker, installation engineer with the Burnley Corporation Electricity Department, has retired after nearly forty years' service.

Mr. H. Breckell, A.M.I.E.E., of Gainsborough, has been appointed electrical engineer and general manager of the Oswestry Corporation electricity undertaking. He received his early training at Preston, and after a period at the Dick, Kerr works of the English Electric Co. he went to Swinton and Pendlebury, where in 1926 he became senior technical assistant to the borough electrical engineer.

He was appointed electrical engineer and manager of the Gainsborough electricity undertaking in 1931. In that year the number of consumers was 650 and the output 1.6 million kWh; at the end of the last financial year the number of consumers had increased to 4,100 and the output to over 6¼ million kWh. During his stay at Gainsborough all the streets in the supply area have been cabled, and a supply is now available to all premises.

Mr. H. Breckell

Mr. Breckell was elected a member of the I.M.E.A. Council in 1937 and he is on the Executive Committee of the Mid-East England Centre of that Association. During the last three years he has been a member of the Technical Consultative Committee of the Central Electricity Board (Mid-East England Area), and he has taken an active interest in E.D.A.

We regret that by a printer's error in the leaderette in our last issue dealing with the new I.E.E. Council, the name of **Dr. E. B. Moullin** was given as Moulton.

Mr. S. W. Melsom, author of the article on "Standardising Distribution" in the same issue, is, of course, with the Cable Makers' Association and not with the Electricity Commission as stated.

Sir Oliver Lodge, the famous scientist, celebrated his ninetieth birthday on Wednesday last.

On the promotion of **Mr. A. E. Jeans** to the position of borough electrical engineer to the Brentford and Chiswick Corporation, **Mr. H. Robson,** B.Sc., A.M.I.E.E., chief technical assistant, is to be appointed deputy borough electrical engineer.

Obituary

Killed in Action.—We hear with great regret that **Lieut.-Col. R. H. Baker** was killed in action on May 21st. He was managing director of the Kersons Manufacturing Co., Ltd., electrical accessories manufacturers, Birmingham.

Sir T. Hudson Beare.—We regret to learn of the death on June 10th of Sir Thomas Hudson Beare, Regius Professor of Engineering, Edinburgh University, since 1901. He was born in 1859 in Australia and came to England in 1880. He was Professor of Engineering at the Heriot-Watt College, Edinburgh, from 1887 to 1889, and was then for about twelve years Professor of Engineering in London University, returning to Edinburgh in 1901.

Dr. E. F. Northrup.—The *Electrical World* reports the death of Dr. Edwin F. Northrup, whose name is associated with the Ajax-Northrup high-frequency furnace which he developed while engaged in research work and lecturing at Princeton University. Dr. Northrup had over a hundred patents standing in his name and at the time of his death, at the age of seventy-four, was vice-president and technical adviser of the Ajax Electrothermic Corporation, Trenton, N.J.

Mr. L. Robbins, whose death occurred on June 4th, was engineer to the Colne Valley Electric Supply Co., Ltd., Pinner, and to the Northwood Electric Light and Power Co., Ltd.

Mr. Frank Farrer, consumers' engineer with the Rochdale Corporation electricity undertaking, died recently at the age of fifty-three.

Mr. R. Rowland.—The death is reported, at the age of sixty-six, of Mr. Robert Rowland, who was the first electrical engineer at the Stretford power station. When the Stretford supply was joined with that of the Manchester Corporation shortly after the last war Mr. Rowland became sales manager to the British Driver Harris & Co., Ltd., Manchester.

Wills.—**Mr. P. F. Rowell,** secretary of the Institution of Electrical Engineers, left £26,404, with net personalty of £25,436.

Col. R. E. Crompton left unsettled estate valued at £15,329 (net personalty £2,538).

Mr. H. A. Neale, of H. A. Neale & Co., electrical engineers and contractors, left 5,631 (net personalty £5,436).

Supply in Manchester

BESIDES wartime restrictions the Manchester Electricity Department has been affected in the past year by the policy of the City Council of replacing trams mostly by motor buses which resulted in a loss of nearly 9 million kWh in traction sales—almost exactly the same as the reduction in street lighting supplies. Under other heads, however, the trend was upward, and altogether the quantity of electricity sold, apart from bulk supplies, increased by 14 million kWh (3 per cent.) to 493 million kWh. In addition, 67.9 million kWh was sold in bulk, an increase of 5 million kWh, and there was a net export to the C.E.B. of 359.9 million kWh (against 335.7 million kWh). The total quantity generated was 1,049.4 million kWh, compared with 1,010.8 million kWh in the previous year.

Industrial activity during the year was responsible for the higher sales, while lighting, heating and cooking supplies in the aggregate were maintained at the previous year's level. In the first few weeks of the war domestic hiring schemes came virtually to a standstill, but there was subsequently a revival on a reduced scale. It is reported that water-heaters are being installed at the rate of about 50 a week, with an evident growing appreciation of the convenience of this particular type of electrical apparatus. A considerable amount of equipment has been installed in first-aid posts, where wash-boilers and storage heaters are provided for sterilising purposes. Electric refrigerators are obtainable from the department on hire-purchase terms, but progress in this field is slow.

Altogether, at March 31st last, there were 23,138 cookers in service, an increase during the year of 1,142; 8,936 water-heaters (2,296 increase); 2,689 wash-boilers (336 increase); and 179,558 other appliances (5,730 increase).

The total number of consumers at the end of March was 190,883, as compared with 184,881 a year before. The revenue of the Department from all sources was £2,137,260 (against £2,221,473), and working expenditure inclusive of all generating costs amounted to £1,690,604 (£1,726,948). The net surplus was £30,293 (£75,245), the whole of which has been appropriated to finance part of the capital expenditure for which borrowing powers did not exist. In considering the result of the year's working it should be recalled that substantial reductions in tariffs came into operation in July last.

The reserve fund stands at £949,744, a reduction of £18,603 from the total at the beginning of the year. In addition to interest the fund was credited with the agreed quota of the C.E.B. area pool and an adjustment under grid operation for the year ended December 31st, 1937. It was depleted by £57,276 for capital expenditure, £46,752 for air-raid precautions, and £22,776 for miscellaneous items. The total outlay on capital account reached £15,522,415, with the loan debt standing at £6,910,475.

NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Shaving Mirrors

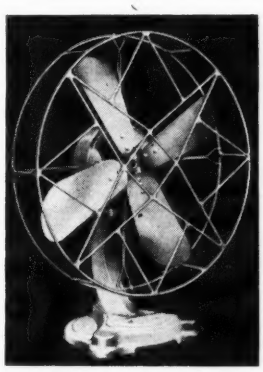
IN the new "Supreme" electric shaving mirrors supplied by L. G. HAWKINS & Co., LTD., a totally enclosed reflector back with special mirrors embodied ensures even distribution of more concentrated light on both sides of the face as well as the chin.

"Supreme" de luxe model shaving mirror

The inexpensive, yet efficient general utility model "LGH. 142," can be used both on the wall or on the dressing table, while the de luxe model, "LGH. 342," finished in gilt and ivory, harmonises with all modern schemes of decoration. A two-pin plug socket is not only useful for inserting an electric razor resistance, but also for curling irons, hairdryers and other such appliances used in the bedroom. An adjustable ash-tray incorporated makes a convenient place on which to rest a razor, curling irons, &c.

Fan Developments

A single-speed fan suitable either for table or wall mounting is the latest product of GRAHAM FARISH, LTD., Mason's Hill, Bromley, Kent. The unit is suitable for AC mains only, being driven by an induction type motor which has no brushes to wear or to cause radio interference. The loading is less than 50 W. The fan can be adjusted over a wide area. Finishes available include ivory and gold and black and gold.

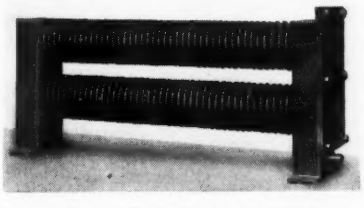


Graham Farish fan

Another development in fans is announced by the E.R. Co., 21, Park Road, Bromley, whose "Erco" 8 in. unit is now available in colour finishes of green, cream and blue as an alternative to black and silver.

Gilled-tube Air Warmers

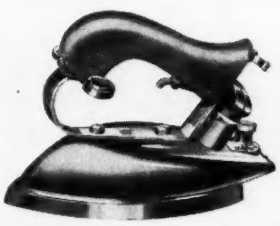
To its range of gilled-tube air warmers HEATRAE, LTD., Heatrae Works, Norwich, has added models of flameproof construction. Both wall and floor patterns are available, arranged in lengths of 2 ft. 6 in., 3 ft. 6 in. and 4 ft. 6 in. in one to five tiers with loadings ranging from 500 to 5,000 W. They are constructed in steel finished in dark brown enamel. A screwed entry for conduit is provided and the winding is arranged in two circuits for heat control by means of external switches.



"Heatrae" flameproof air warmer

Thermostatically-controlled Iron

T. PRICE & SON (STAMPERS), LTD., Spring Hill Passage, Birmingham, have introduced the "Prilect Junior" thermostatically controlled iron to meet wartime conditions, which entail standardisation in design with other models not containing thermostats. It is loaded at 600 W, and is suitable for AC only. The weight is 4½ lb. and the apparatus is extremely robustly constructed considering its low price.



"Prilect Junior" iron

Both nickel-plated and chromium-plated finishes are available. Though intended primarily to meet the competitive requirements of the export market, the makers state that the iron will be available in limited quantities for the home trade.

Multicore Solders

MULTICORE SOLDERS, LTD., Bush House, W.C.2, inform us that they have developed a new solder containing three independent cores of "Ersin" flux. This flux is a pure high-grade rosin which has been specially treated to increase its fluxing action without impairing the non-corrosive and protective properties of the original rosin. As a result not only does it remove surface oxides but it also prevents their further formation during the course of the soldering operation.

The provision of three separate cores each containing flux eliminates the possibility of there being no flux in a portion of the wire, as happens sometimes in the case of single-cored solder. Moreover, very rapid melting results from the construction, which provides thinner walls of solder than are found in single-cored solder of the same gauge.

The solder can be supplied in any alloy of normal specification and in any gauge from 10 to 22 s.w.g. It is supplied in 1 or 7-lb. reels or in 28-lb. cartons. Special reels for automatic soldering machines are also available.

Weatherproof Switch-plug

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has added to its weatherproof accessories a switch-plug suitable for all industrial situations necessitating a robust construction. It is of the three-pin type and is rated at 5 A, 250 V.

Weatherproofing is effected by introducing a hemp gasket inset in a channel on the underside of the cover which forms a seal between the cover and case. Entrance of water through the cover-fixing screw holes is prevented by corner lugs which project outside the channel. Gaskets are also fitted in channels around the plug and the brass spring-closing cover of the socket outlet.

G.E.C. weatherproof switch-plug

The case is a substantial casting finished to match "Silverlac" conduit and is provided with two pads for drilling and tapping for conduit entry, the standard pattern being tapped with one ¾-in. e.t. entry. The plug also matches "Silverlac" conduit, while the switch has a double-pole movement of the "Landor" rapid-make rapid-break type.

Maximum protection is afforded by a spring-loaded shutter which covers the earth socket tube should the switch be left in the "on" position and the plug withdrawn. This is supplementary to the shutter covering the "L" and "N" tubes.

"Metrovac" Pumps

In our issue of May 31st we published a description of "Metrovac" pumping sets from information supplied by Edwards & Co., Loughborough Junction, who were described as the makers. We are now informed by the Metropolitan-Vickers Electrical Co., Ltd., that the equipment is made by them and that "Metrovac" is their trade mark. We regret the error.

Indicating Fuse

A new magazine model fuse, made by RUNBAKEN ELECTRICAL PRODUCTS, 13-15, Liverpool Road, Deansgate, Manchester, not only indicates when a fuse is blown, but may be automatically reset six times by turning to a new position. It is available in amperages from 5 to 50, larger sizes being supplied to any specification.

Runbaken indicating fuse

Electric Incinerator

An electric incinerator has just been designed by the JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, S.W.1, for use in ladies' cloakrooms in large stores, offices, works, restaurants, hotels, schools, etc., and also in hospitals for the disposal of bandages, dressings, etc., its installation effecting considerable savings in cost and inconvenience due to the necessity for the opening and clearing of drains which have become blocked by insoluble materials.

Jackson electric incinerator

The apparatus comprises a cylindrical steel combustion chamber at the base of which is fitted a special protected type tubular heating element (400 W), upon which materials dropped through a hinged door fall and are consumed. The terminals for the element are taken through the back and covered by a terminal box fitted with an insulated bush for cable entry, all live parts thus being completely protected. The ashes drop through a grid to a sliding-drawer type removable ash-pan. The combustion chamber is housed in a one-piece carcase of cast iron, finished in mottled grey vitreous enamel. Both floor or wall mounting are provided for, some form of fume outlet being essential in either case.

COMMERCIAL and INDUSTRIAL NEWS

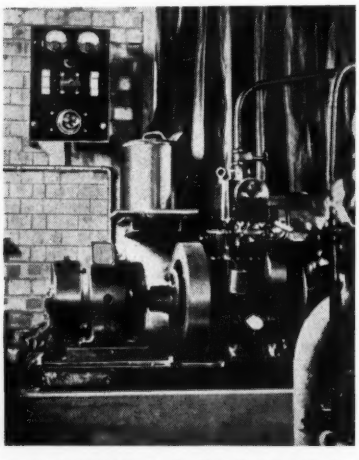
Flood Fighting Plant. Control of Machinery. The Bradford Inquiry

War Damage to Property

INQUIRIES having been received from electricity undertakers as to what steps should be taken to claim compensation in respect of property damaged by enemy action, the Electricity Commissioners have forwarded to each of the Electricity Supply Associations for their information and any action they may consider it desirable to take regarding the notification of the position to their constituent members, a copy of the question asked by Mr. Pethick Lawrence, M.P., in the House of Commons on March 19th and of the reply thereto by Captain Crookshank, M.P. In his reply Capt. Crookshank said that claimants under the Government's compensation scheme for war damage to property should make a claim on a form which could be obtained in Great Britain at the local town hall or the office of the local authority, or at the office of the local district valuer, Inland Revenue Department, and in Northern Ireland at the office of the Commissioner of Valuation, Armagh House, Ormeau Avenue, Belfast. The form contained the necessary instructions for its completion.

Electricity for Flood Fighting

Modern methods and equipment are replacing the old engines used in many of the Fen districts in the fight against floods, and at some pumping stations in and around Lincolnshire electric motors have been installed to drive the pumps. At many others the work has been facilitated by electricity for lighting. Penney & Porter, Ltd., of Lincoln, have carried out many of these installations, using Callender cable throughout. At Marton, Lincs, electric motors supplied are of 70 HP and 140 HP, the former dealing with 40 to 50 tons of water per minute at 600 RPM and the other 80 to 100 tons per minute at 480 RPM. The plant replaces steam boilers, single-acting Cornish engine and reciprocating pump installed eighty years ago and dismantled in 1923 as inadequate. Repeated flooding of the area subsequently led to the decision to provide the new equipment. The pumps are positioned below the lowest water level, and the electric motors, well above flood level, are direct coupled to the pumps. Both hand and automatic control is arranged.



A pumping station in the Fen district showing machinery and controls

Another installation is at Black Drain, Rawcliffe, Yorks, where the electric motors are 240 HP and 150 HP, and smaller motors have been supplied to the Nocton Booster, Lincs, and Lincoln Corporation Booster at Bracebridge Heath. The same contractors also used Callender cables for lighting installations at pumping stations in Cambridgeshire, Northants and Suffolk.

Machinery and Plant Control

Under the Machinery and Plant (Control) Order, 1940, the acquisition and disposal of certain machinery and plant is prohibited except under licence issued by the Board of Trade. All persons who propose to acquire machinery or plant of any of the specified classes must therefore first obtain a supply licence from the Industrial Supplies Department (Machinery Licences Division), Board of Trade, 25, Southampton Buildings, W.C.2, and no person may dispose of machinery or plant without first ascertaining that the user has already obtained a licence for the supply from him of that machinery or plant. Machinery or plant for direct delivery to an overseas market or to a Government-controlled establishment is, however, exempt from these requirements. There is also an exemption for replacement parts. Each supply licence has attached to it a certificate which should be obtained by the machinery manufacturer and held by him until the machinery or plant has been delivered, when the certificate should be returned to the Industrial Supplies Department. The licence should also be returned to that Department by the licence holder when the machinery or plant has been delivered.

It should be noted that the supply of machinery or plant of the classes specified under contracts made prior to the date of the Order (June 6th) is not exempted from the licensing regulations and persons who have already placed orders for such supplies should make their applications for licences without delay on forms which are obtainable from the Department. The following machinery or plant, and parts thereof, are affected:—Bakery machinery and plant; bottling and capping machinery (other than for milk bottling and capping); confectionery and sweet-making machinery and plant; embroidery machinery; hat-making machinery; knitting and hosiery machinery; machinery and plant for making toilet preparations other than soap; machinery for filling and closing containers (other than bottles) for merchandise; packing and wrapping machinery; paper-making machinery and plant; printing and bookbinding machinery; scent-making machinery and plant; sugar-making and refining machinery and plant; textile machinery (including printing and finishing machinery); tobacco, cigar and cigarette-making machinery and plant; woodworking machinery.

General Import Control

Under the Import of Goods (Control) Order, dated June 4th, 1940, the importation of all goods, except live quadruped animals, is prohibited save under a licence granted by the Board of Trade. The Order revokes the Import of Goods (Prohibition) (Consolidation) Order, 1939, and the following Import of Goods (Prohibition) Orders of 1940: Nos. 1, 3, 5, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21. The Order provides that any licence granted by virtue of the provisions of any of the revoked Orders (other than a licence already revoked by the Board of Trade) shall have effect in relation to any prohibition imposed by this Order.

Imported Arc-lamp Carbons

The Import Duties (Exemptions) Order, dated June 6th, 1940, exempts arc-lamp carbons from the general *ad valorem* duty imposed by Section 1 of the Import Duties Act, 1932.

Control of Employment

The Minister of Labour and National Service has made the Undertakings (Restriction on Engagements) Order, dated June 5th, which provides that employers in certain industries shall not engage or seek to engage any worker except by notifying to a local office particulars of the vacancy to be filled and by engaging for that vacancy a worker submitted to him by a local office. Also a worker seeking to engage for work in any of the scheduled industries must register himself for work at a local office and obtain his employment by means of being submitted to an employer by a local office. These provisions do not apply to the re-engagement of any person by an employer within fourteen days of his last employment by the employer or upon the termination of a period of sickness, nor to persons who are employed as managers, salesmen or clerks (other than costing and progress clerks and draughtsmen). The industries scheduled are the building industry, the civil engineering contracting industry and the general engineering industry. The last-named is defined as "the manufacture, assembly or repair of goods or articles of iron, steel or non-ferrous metals, which involves the use of machine tools, foundry or forging plant, but shall not include the construction of the hull of a ship or any ship repair work." The Order came into force on June 10th.

Electric Vehicles for Sheffield

Sheffield Corporation Electricity Department is to purchase five electric vehicles to replace petrol vehicles.

Reserved Occupations

Considerable alterations have been made to the Schedule of Reserved Occupations, principally with the object of giving younger men the choice between service in the Forces or service in one of the munition industries. Among the occupations in which the age of reservation is being raised from 25 to 30, with effect from August 1st, are included the following:—Stove, grate, range, refrigerator, radiator maker, assembler. New entries in the schedule with immediate effect and with various ages of reservation include the following headings:—Electricity generation and public utility undertakings staff.

Fatalities

Four men received fatal electric shocks in unusual circumstances at Farley, near Much Wenlock, recently. They were reversing a lorry along a rock tip when the tipping screw of the vehicle came into contact with an overhead line. Two of the men were killed immediately while the others met their death in endeavouring to assist their mates.

At Blackpool recently an inquest was held into the death of a fitter-electrician who was killed while using an electric drill at an entertainment place at Blackpool. It was stated in evidence that owing to a defect in the drill it was not earthed and the connecting flex was very badly jointed. A verdict that death was caused by "asphyxia due to electrocution" was returned.

Substation Equipment at an Engineering Works

Recent expansion and addition to the Plessey Co.'s works at Ilford have given rise to problems associated with a large electric power supply.

The power requirements of the factory are met by a duplicate feed from the Ilford Corporation Electricity Department mains at 6,600 V, three-phase, 50 cycles. This is controlled by Crompton Parkinson metalclad and compound-filled switchgear having a rupturing capacity of 200 MVA. In turn, the e.h.v. supply is made available to a ring main on the consumers' premises to three separate substations by means of Crompton Parkinson type "A" ring main units.

In each of the three substations there are two 500-kVA power transformers made by the British Electric Transformer Co., Ltd., and these provide a l.v. supply for the works feeders at 400 V. The output of each transformer is controlled by Crompton metalclad industrial type switchgear having a breaking capacity of 25 MVA and is connected through an 800-A unit to the substation l.v. busbars. In turn, the busbars provide a supply to similar "Klad" "A" switches varying in rating between 600 and 800 A to control the output to the various works feeders. In two of the substations an extra switch unit is included in the board to act as the stator switch and protection for a 250-kVA synchronous condenser.

Individual drives have been arranged for the machine tools and these have necessitated the use of many hundreds of squirrel-cage induction motors varying in output between 1 and 10 HP. In most cases standard foot-mounted Crompton

Parkinson motors have been adapted and arranged for V rope drives to the various machines.

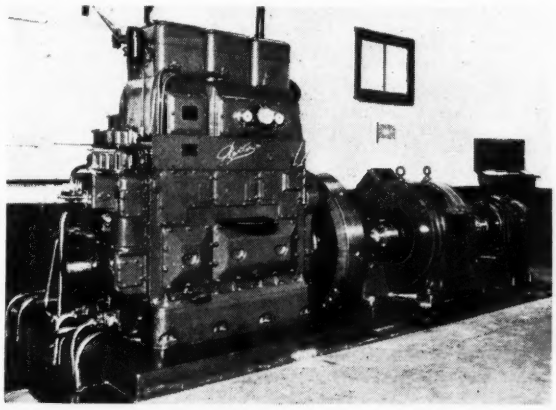
To raise the power factor to a figure of 0.85 lagging, two 250-kVA synchronous condensers are installed in the first two substations, and Crompton auto-synchronous motors on the driven units connected to the third. In order to prevent an undesirable leading power factor under any condition of loading, automatic control is provided by Whipp & Bourne regulators on the two synchronous condensers.

On the third substation the most recent load has been demanded by an 80-HP air compressor. A Crompton auto-synchronous motor designed to run at 0.8 leading power factor has been chosen as the most suitable power unit to assist in maintaining the required power factor on this feeder. The control gear for this item consists of a combined stator and rotor starter such as might be used on a slipring induction motor of equivalent HP rating. In addition, a control pedestal is provided carrying an excitation regulator and a moving-coil ammeter to give an indication of the degree of correction.

British Plant Overseas

The intensive drive during the last few years by British manufacturers of machinery to widen their overseas markets has resulted in the development of plant especially suited to stand up to gruelling conditions of service in remote parts of the world where skilled attention and maintenance are not so readily available as they are in this country.

An instance of the successful operation of British plant in Australia is provided by the power station of the Burra Electricity Supply Co., Ltd. The first engines installed in the power station in 1924 were of Petter design and manufacture, and on three subsequent occasions the additional power required has also been supplied by Petters, Ltd. The latest engine to be installed is a "Superscavenge" diesel of 187.5 BHP coupled to a Harland alternator of 125 kW.



A Petter "Superscavenge" Diesel engine coupled to a Harland alternator at the station of the Burra Electricity Supply Co., Ltd.

Mica Undercutters

An illustrated list of mica-undercutting equipment has been received from the Martindale Electric Co., Ltd., Westmorland Road, N.W.9, which believes itself to be the only company in this country holding comprehensive stocks of saws and cutters in a full range of thicknesses, including small sizes now in great demand for Service work.

A.R.P. Safety Lighting

The protection of the public in town halls, theatres and other places of entertainment from falling electric lighting fittings in the event of an air raid can be carried out in several ways. The obviously best ways are the removal of glass panels and the substitution of translucent material, or in the case of heavy fittings, the installation of designs of lighter construction. The drawing office and technical staff of Falk Stadelmann & Co., Ltd., are prepared to advise in respect of such lighting problems and the company has issued a leaflet in which it draws attention to the service which is available, and illustrates a typical example of fittings recently supplied by the company for installation in a ballroom.

Plastics Export Groups

Two export groups have been formed by the plastics industry. The first is the Moulding Powder Manufacturers' Export Group of which Mr. K. M. Chance (Beetle Products Co., Ltd.) is chairman and the other is the Moulders' Export Group with Mr. H. Bridge (Thomas de la Rue & Co., Ltd.) as chairman.

Steam Turbine Tests

Since the publication of the British acceptance test code for steam turbines (B.S. 752) in 1937, international agreement has been reached regarding a supplement to the code, this taking the form of extensive notes on instruments and methods of measurement. These notes have now been incorporated as an appendix to B.S. 752, thereby considerably increasing the usefulness of the code. A further appendix has also been included to show the internationally agreed symbols for use on diagrams of the layout of steam turbine plant. Copies of the revision may be had from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 3s. 10d. post free.

Industrial Information

The Minister of Supply has made the Industry (Records and Information) (No. 1) Order, 1940, which directs that every person carrying on any undertaking may be required to keep such books, accounts and records as may be prescribed and produce them to a competent authority when required to do so. Information may also be called for regarding the undertaking in prescribed form and within a certain period.

London Chamber of Commerce

In the course of his address at the annual meeting of the London Chamber of Commerce on June 6th, Sir Alexander Gibb, the retiring president, referred to the assistance which the Chamber had given since the outbreak of war both to the Government and the business community. Early in October it started a campaign for the removal or modification of those wartime difficulties which were weighing most heavily on the industry and commerce of the country. It was also entrusted with the difficult task of recovering British cargo from German vessels which had taken refuge in neutral ports.

Sydney Importers' Message

The Secretary to the British Council of the Australian Association of British Manufacturers, Miss S. Atterbury, has received the following telegram from Mr. S. F. Ferguson, Director at the Head Office in Melbourne:—

"Wholesale Importers' Association of Sydney, representing a large body of traders, ask me to cable on their behalf expressing to your members their keen appreciation of the enormous difficulties under which exporters and manufacturers are working, and assuring you of their fullest sympathy of thought and expressions of goodwill."

Prices of Materials

Henry Gardner & Co., Ltd., report, June 12th: Mercury, £51 18s. 6d., £3 1s. 6d. decrease. English block tin, £285, £8 increase.

Edward Till & Co. report, June 12th: India-rubber, Para, fine, 1s. 3½d., ½d. increase.

Change of Name

The Foster Engineering Co., Ltd., has changed its name to Foster Transformers & Switchgear, Ltd.

New Catalogues and Lists

Knightshades, Ltd., Derby Road Works, Montague Road, Edmonton.—The new season's catalogue of lamps, lampshades and fittings.

Bill Switchgear, Ltd., Aston Lane, Perry Barr, Birmingham.—Leaflet 53 HRC, describing a new range of h.r.c. fuse switches.

Consolidated Pneumatic Tool Co., Ltd., 232, Dawes Road, S.W.6.—Catalogue No. 50 covering the company's entire range of pneumatic tools. Reference is simplified by a thumb index.

R. F. Winder, Ltd., Belgrave Electrical Works, Leeds.—The June register of surplus new and second-hand electrical material.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department, through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:

Crystallised carborundum for bar elements.

The Bradford Case

Report of Committee of Inquiry

IN November last, as we reported at the time, Mr. A. S. Rhodes, an employee of the Bradford Corporation Electricity Department, and Mr. A. N. Wilson, a local electrical contractor, were committed for trial on charges of conspiracy to defraud the Corporation. It was alleged that Rhodes had passed for payment certain commission in respect of the securing of hire and hire-purchase business by Wilson. The jury found the defendants "Not guilty" but criticised the administration of the Department. Subsequently the City Council set up a committee to inquire into the matter.

This Committee's report was to be presented at a meeting of the City Council on Tuesday last. It stated that a number of witnesses were interviewed and it dealt at some length with the circumstances of the case and a number of recommendations were made. The head of the Department (Mr. T. Roles) was criticised for the weakness in the administration which made irregularities possible over a considerable period. The Committee recommended that Mr. C. E. Allsop, the commercial manager of the Department, should be severely reprimanded for his action in interviewing witnesses for the prosecution and approaching Mr. Wilson for the refund of the moneys alleged to have been wrongfully obtained, thereby possibly prejudging subsequent criminal proceedings. That Mr. Rhodes should be given notice forthwith to terminate his service with the Corporation. That Mr. F. Smith, who called attention to irregularities in the Department, should be commended. That in future in any case of suspected felony involving a Corporation official when the Town Clerk advised police investigation and the suspension from duty of the official concerned his advice should be acted upon. That the scheme for the payment of commission in respect of hire and hire-purchase business (if continued) should be amended so as to provide that a contractor, before being allowed commission, must submit a signed statement from the consumer to the effect that the contractor's canvassing was responsible for the business. (It was announced in our last issue that the commission scheme had been stopped.) That some person with business experience and managerial ability should be appointed in the Electricity Department with power to conduct periodical checks and examinations of all business methods and to call for any information from sub-departments to enable him to make reports and recommendations from time to time to the city electrical engineer. That the title of the head of the Department should be altered to "city electrical engineer" (at present the position is designated "city electrical engineer and manager").

ELECTRICITY SUPPLY

Blackburn and Bradford Gas-Electricity Moves. New French Decree

Blackburn.—GENERATING PLANT POSITION.—In his annual report Mr. R. H. Harral, the borough electrical engineer, states that the generating station "with the present obsolete and inefficient plant, cannot be regarded as satisfactory." A scheme for the installation of new generating plant was delayed by the war, with the resultant possibility of a serious effect on the undertaking's capacity to deal with the load.

JOINT SALES ORGANISATION DEFERRED.—In order to avoid further dissension the Town Council party leaders have agreed "that for the duration of the war or for a period of two years, whichever is the less, no action be taken to implement the decision of the Town Council meeting of April 4th relating to the Gas and Electricity Departments except in so far as such decision refers to the joint reading of gas and electricity meters, control of rentals and continuous billing." The effect of this agreement is that the decision to amalgamate the sales organisations and showrooms of the two Departments will be deferred.

LOANS.—The Electricity Committee proposes to apply for sanction to borrow £6,539 for electricity mains, £4,609 for substation equipment, and £1,307 for first-aid posts.

Bradford.—ELECTRICITY AND GAS COMPETITION.—The Special Committee on Economy set up by the Corporation recommends the elimination of competition between the Electricity and Gas Departments. The Committee comments on the spirit of "violent competition and lack of co-operation between the two Departments, resulting in practices both wasteful and unsound." As no amount of argument or persuasion will induce the desired amount of co-operation it is suggested that the City Council should stop the system of simple hire, and confine the two Departments to the production of their commodities and the laying of mains and cables, and that the sales department should be run as a joint concern under a manager and staff, without bias to either service. On the first point the Finance Estimates Sub-Committee expresses approval, but has adjourned consideration of the second, together with a recommendation that publicity and showrooms, costing £12,400 a year in the two Departments, is uncalled for and could be reduced. It approves a suggestion that meter readers and inspectors should be trained to function for both Departments.

Dumfries.—PAYMENT TO CONTRACTORS.—An application by local contractors for an increase in payments made to them for wiring work under the Electricity Department's assisted wiring scheme and in connection with hired appliances has been granted. The increases are to be at the rate of 20 and 15 per cent. respectively.

Earby (Colne).—ELECTRICITY CHARGES.—At a recent meeting of the Urban District Council the Electricity Committee expressed the view that increased charges were not at present desirable, but that the financial position should be carefully watched and reviewed in a few months' time. The Committee had carefully considered the trend of future increased costs in the undertaking before coming to this conclusion.

Eston.—COOKER HIRE TERMS.—The Electricity Committee has arranged to continue the issue of cookers on hire at existing rates so long as manufacturers' prices remain at the present level and the matter will be considered further in the event of price advances.

Exeter.—HIRE CHARGES.—The Electricity Committee has recommended the withdrawal of the 10s. per annum rebate granted to all-in tariff consumers within the city boundary in respect of the *de luxe* electric cooker, as from the mid-summer meter readings. The rebate on the older type cookers is to continue, but the rental of the standard *de luxe* cooker will be increased from 3s. to 5s. 6d. per quarter.

Glasgow.—MAINS EXTENSIONS.—The Corporation Electricity Committee has approved mains extensions costing £533.

Hastings.—HIGHER FLAT RATE.—It is proposed to raise the general lighting rate for the first 4,000 kWh per annum from 4d. to 5d. per kWh and the rate for additional consumption from 3d. to 4d.

SUPPLY EXTENSION.—The Electricity Committee is making arrangements to provide a supply to New Barn, Old Place Farm, Icklesham.

Huddersfield.—CHARGES TO LARGE POWER CONSUMERS.—For electricity supplied to certain three-phase consumers the basic price for consumption in excess of 3,000,000 kWh per annum is to be increased from 0.35d. to 0.4d. per kWh.

CENTRALISED SIREN CONTROL.—All A.R.P. electric sirens are to be equipped with the "Ripplay" control system.

SUBSTATIONS.—The construction of three new substations and the extension of two others has been recommended.

Leeds.—SUBSTATION SITE.—The Electricity Committee has purchased a site for a substation on the Grange Park estate, Roundhay.

Manchester.—COST OF COAL.—Mr. H. C. Lamb, chief engineer and manager of the Electricity Department, has reported that as a result of an increase of 8d. per ton in the pithead price of coal, and the 10 per cent. higher railway charges, coal costs incurred by the Electricity Department for the period May 1st, 1940, to January 31st, 1941, will, it is estimated, be increased by approximately £32,000.

Market Drayton.—SCHEME IN ABEYANCE. At the monthly meeting of the Rural District Council a letter was read from the North-West Midlands Joint Electricity Authority stating that owing to the capital expenditure involved, which was not justified by the revenue, and inability to obtain materials except for essential work, it was necessary to leave in abeyance the provision of an electricity supply to Council houses at Dorrington and Dorrington Hall Farm.

Northern Ireland.—BELFAST.—Electricity charges are to be increased by 10 per cent. in all cases except prepayment meter supplies.

Rochdale.—INDUSTRIAL POWER PRICE INCREASE.—The Corporation has decided that as from July 1st the charges for the supply of electricity to industrial power consumers whose demands exceed 15 kW shall be increased by 6 per cent. It was explained at the Town Council meeting that it seemed certain that the loss on the undertaking for the past financial year would not be less than £6,500, due to increased working costs and diminished revenue. The proposed increase will bring in approximately £11,000 in a full year.

Sittingbourne.—HOSPITAL SUPPLY.—At a recent meeting of the Sittingbourne and Milton Joint Hospital Board a committee was appointed to consider the closing down of the power plant at the hospital. An estimate for a supply from the public mains is being obtained from the Kent Electric Power Co.

Sunderland.—EXPENDITURE OUT OF REVENUE.—The Town Council proposes spending £600 on meters and £3,500 on wiring and apparatus during the current year. The amount will be met out of revenue.

Swindon.—ELECTRIC SHUNTING LOCOMOTIVE.—The Electricity Committee has retained the services of Messrs. Preece, Cardew & Rider in connection with the purchase of a battery-operated shunting locomotive.

LOAN SANCTIONS.—Permission has been obtained to borrow £2,279 in connection with the Moredon power station, and £18,500 for re-rating switchgear.

Tottenham.—PURCHASE OF UNDERTAKING DEFERRED.—The Town Council has again deferred the purchase of the electricity undertaking from the Northmet Power Co., and has decided to continue to accept annual payments (now £9,000 a year) in consideration therefor until 1949 or the enactment of public legislation affecting the ownership of the undertaking.

Wigan.—DEPARTMENT'S PROFIT.—The Electricity Committee reports that during the year 1939-1940 the Department made a profit of £27,000 as against £38,000 in the previous year.

Overseas

Canada.—TRANSMISSION SCHEME.—A new 220-kV transmission line from the Quebec boundary will be constructed shortly, it is announced by the Ontario Hydro-Electric Power Commission. The line will be constructed at a cost of between $6,000,000 and $7,000,000 and will be in service as far as Leaside, suburban Toronto, within a year.

France.—LIMITATION OF ELECTRICITY SUPPLIES.—Authority to limit electricity supplies or even to cut them off altogether is given to the Minister of Public Works under a Decree published in the *Official Journal*. The Decree is designed to provide for the needs of factories engaged on national defence work and the risk of the destruction of electricity supply stations.—*Reuter.*

United States.—PLANT CONSTRUCTION ACTIVITY.—The latest estimate of the Edison Electric Institute of expenditure on construction works in the electric light and power industry this year is $643,000,000 against $462,410,000 in 1939. This does not include budgeted expenditures on Federal hydro-electric projects. Among the different classes the greatest increase is in expenditure on steam stations, on which the amount to be spent this year is $183,700,000, against $70,560,000 last year.—*Reuter's Trade Service.*

TRANSPORT

London.—NEW TROLLEY-BUS ROUTES.—Two tram routes—Nos. 65 and 67—were replaced by trolley-bus services last week-end, completing the conversion work in hand at the outbreak of war. The new trolley-bus services are between East Ham and Aldgate, and the last East Ham tram was driven by Inspector H. R. Squires, who drove the first along the same route in 1901. The London Passenger Transport Board now operates 256 trolley-bus route miles and 102 miles of tramways, with rolling stock consisting of 1,671 trolley-buses and 1,127 trams.

South Shields.—TROLLEY-BUSES.—The Town Council is to apply to the Ministry of Transport for an extension of the time in which it may commence the operation of trolley-buses along routes authorised by the South Shields Corporation Act, 1935, as regards powers which have not yet been exercised.

Trolley Line Equipment

A REVISED specification for overhead equipment, collector wire and accessory fittings, has been issued by a Joint Committee representing the Municipal Passenger Transport Association and the Public Service Transport Association. Copies are obtainable for 2s. 6d. each from either organisation. Hitherto this Committee has not only prescribed the composition of materials and both the mechanical and electrical performances of the equipment, but has also included drawings which have defined in complete detail the construction of overhead fittings.

These have been mainly of interest in tramway construction, so that when an attempt was made to standardise new types of fittings for trolley-bus systems, the design of which is rapidly changing, the views of operators were found not to be unanimous because of varying local needs and preferences. Therefore, in an endeavour to make the present revision more effective, only performance and essential requirements have been specified, detailed design having been left to manufacturers in conjunction with operators. This procedure follows the principle adopted in the preparations of the fourteen related British Standard Specifications.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. *each*) *can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

1938

24005. "Magnetic apparatus for detecting the passage of vehicles and other traffic." Automatic Signal Corpn. August 14th, 1937. (521339.)

24015. "Electric comunication systems." Telephone Manufacturing Co., Ltd., and L. H. Paddle. August 15th, 1938. (521340.)

29132. "Switches for use, for instance, in automatic telephone systems." Standard Telephones & Cables, Ltd. November 10th, 1937. (521144.)

29162. "Transmission of signals over polyphase circuits." R. E. H. Carpenter. October 7th, 1938. (521191.)

29183. "Permanent magnets." S. I. Hitchcock. October 7th, 1938. (521145.)

29304. "Electric motor control systems." General Electric Co., Ltd., and E. H. Croft. October 10th, 1938. (521192.)

29824. "Operating mechanism for electric switching means, more particularly for use with electric motor control systems." General Electric Co., Ltd., and E. H. Croft. October 14th, 1938. (Cognate application, 36686/38.) (521195.)

29893. "Wall boxes for mounting electrical units." C. H. Parsons, Ltd., and G. B. Handley. October 15th, 1938. (521241.)

32240. "Synchronous electric motor with improved braking and reversal characteristics." B. P. Verel. November 7th, 1938. (521151.)

32544. "Electric heating units." British Thomson-Houston Co., Ltd. November 9th, 1938. (521248.)

32550. "Light sensitive cells." Zeiss Ikon Akt. Ges. November 12th, 1937. (521158.)

32569. "Electric cables for heavy currents." Felten & Guilleaume Carlswerke Akt. Ges. December 24th, 1937. (521253.)

32593. "Electromagnetically actuated means for indicating the intended direction of travel of vehicles." Auto Union Akt. Ges. November 10th, 1937. (521200.)

32684. "Device for the electromagnetic control of light for producing a sound record." I.G. Farbenindustrie Akt. Ges. November 10th, 1937. (521166.)

32741. "Electric convection heaters for greenhouses and the like." Electro-Horticultural Equipment Co., Ltd., and P. Dunsheath. November 10th, 1938. (521168.)

32851. "AC electric motors." General Electric Co., Ltd., and E. K. Bottle. November 11th, 1938. (521291.)

32941. "Synchronous motor clocks." P. Firchow Nachfolger Apparate-u Uhren-Fabrik Akt. Ges. December 23rd, 1937. (521217.)

32947. "Manufacture of insulated electrical conductors." Standard Oil Development Co. February 25th, 1938. (521296.)

32954. "Electric switches, socket connectors, and the like." J. H. Tucker & Co. and S. A. Millington. November 12th, 1938. (521178.)

32965. "Anti-vibration mountings for barretter lamps as used in telephones." Automatic Telephone & Electric Co., Ltd., and H. A. Holburn. November 12th, 1938. (521220.)

32973. "Time-base control arrangement for oscillographs." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. November 12th, 1937. (521221.)

33038. "Electron multiplier tube." Farnsworth Television, Inc. November 29th, 1937. (521299.)

33039. "Electron multipliers." Farnsworth Television, Inc. November 29th, 1937. (521347.)

33213. "Means for the automatic control of the magnitude and/or direction of the flow of power in an electric circuit." C. E. Sayer, and Nalder Bros. & Thompson, Ltd. November 15th, 1938. (521,355.)

33226. "Modulating and demodulating arrangements." Automatic Telephone & Electric Co., Ltd., T. B. D. Terroni, and J. B. McCusker. November 15th, 1938. (521313.)

33229. "Regulating arrangements for electrical circuits." H. M. Harmer and A. F. Canut. November 15th, 1938. (521314.)

33233. "Electric arc welding." L. Jones, and Metropolitan-Vickers Electrical Co., Ltd. November 15th, 1938. (521315.)

33234. "Apparatus for the electrostatic precipitation of suspended particles from gases." H. Smethurst, P. M. Miln, and Metropolitan-Vickers Electrical Co., Ltd., November 15th, 1938. (521316.)

33260. "Electromagnetic deflecting coils for cathode-ray tubes." Marconi's Wireless Telegraph Co., Ltd. November 16th, 1937. (Addition to 495016.) (521356.)

33351. "Electrical induction apparatus." British Thomson-Houston Co., Ltd. November 18th, 1937. (521361.)

33366. "Electrically actuated hammers." J. T. Shevlin. (Patentverwertungs Ges. Hermes.) November 16th, 1938. (521364.)

33369. "Electric actuation of fire-arms, searchlights, and the like." Fabrica Italiana Magneti Marelli. November 17th, 1937. (521366.)

33371. "Television and like systems." W. Jones, and Pye, Ltd. November 16th, 1938. (Cognate application, 100/39.) (521367.)

33428. "Gravity operated electric switches and their use in automatic fire extinguishing systems upon aircraft and the like." Graviner Manufacturing Co., Ltd., H. M. Salmond and A. Mathisen. November 17th, 1938. (521374.)

36698. "Electric water heaters." Heatrae, Ltd., C. H. Smith and C. Ellis. December 16th, 1938. (521381.)

1939

13766. "Superheterodyne wireless receiving sets." Philips Lamps, Ltd. May 11th, 1938. (521330.)

13767. "Electric gasfilled incandescent lamps whose operating pressure exceeds 4 atms." Philips Lamps, Ltd. May 10th, 1938. (521331.)

24269. "Switchgear for electrically operated hand tools." Black & Decker Manufacturing Co. July 19th, 1938. (Divided out of 519504.) (521235.)

Financial Section (*Concluded from page 646*)

Reports and Dividends—continued.

The Delhi Electric Supply & Traction Co., Ltd., reports a net revenue for 1939 of £53,691, as compared with £53,077 for 1938, less administration and miscellaneous expenses of £4,881, leaving £48,810. Depreciation and renewals reserve receives £15,000, income tax reserve £12,000, and the final dividend is 5 per cent., making 9 per cent., tax free, for the year (against 10 per cent., tax free). The balance carried forward is £24,674 (against £20,864 brought in).

The Electrical Finance & Securities Co., Ltd., reports a profit for 1939 of £60,164, as compared with £48,675 for the preceding year. The final dividend is 6 per cent., making 10 per cent., less tax, plus a bonus of 2½ per cent., less tax (same). The balance carried forward is £45,692 (against £42,903 brought in).

Keith Blackman, Ltd., report a net profit for the year to March 31st of £32,770, as compared with £32,528 for 1938-39. The ordinary dividend for the year is maintained at 15 per cent.

The Para Electric Railways & Lighting Co., Ltd., reports a loss for the year to November 30th, 1939, of £36,459, as compared with a loss of £32,790 for the previous year. The debit carried forward is £157,411. The gross receipts for the year were £108,510 (against £113,851).

The Telegraph Condenser Co., Ltd., is paying 3 per cent. off preference dividend arrears in respect of the half-year to June 30th, 1939. A similar payment was made in April last on £130,000 6 per cent. cumulative redeemable preference shares.

The Buenos Aires Lacroze Tramways Co.—A scheme of arrangement is proposed by the company in connection with its three classes of debentures. The company receives $29,952,999 in ordinary shares of the Buenos Aires Transport Corporation as consideration for the transfer of its undertaking to the latter. It is proposed that $17,600,000 of the shares shall be held as specific security for the three debenture issues, the balance of $12,352,999 to be applied in satisfaction of claims arising under credit agreements and other indebtedness. The share capital is to be reduced from $25,000,000 to $3,750,000, allowing writing off of past losses and debits.

The B.E.T. Electricity Supply Co., Ltd., reports a revenue to the year March 1st of £71,389, as compared with £68,602, and a net profit of £45,705 (against £46,828). The dividend for the year is maintained at 4 per cent. and £27,499 is carried forward (against £23,915 brought in).

The Boston & District Electric Supply Co., Ltd., reports a profit for 1939 of £25,637, as compared with £26,034 for 1938. The dividend for the year is 6⅔ per cent., against 7 per cent. and £5,271 is carried forward (against £4,167 brought in).

The Northwood Electric Light and Power Co., Ltd., reports a net revenue for 1939 of £35,655, as compared with £27,702 for the previous year. The ordinary dividend for the year is 8 per cent. (against 7 per cent.) and £1,721 is carried forward (against £1,420 brought in).

The Colne Valley Electric Supply Co., Ltd., reports a net revenue for 1939 of £53,537, as compared with £34,088 for the preceding year. The dividend for the year is 5⅔ per cent. net (against 4½ per cent. net) and £8,528 is carried forward (against £1,608 brought in).

The Lisbon Electric Tramways, Ltd., reports a net profit for the year to December 31st of £143,626, as compared with £152,516 for 1938. General and depreciation reserves receive £55,000 and the final ordinary dividend is 4 per cent., making 6½ per cent. net for the year (against 7½ per cent. net) and £32,705 is carried forward (against £31,430 brought in).

The Lothians Electric Power Co. reports a revenue for 1939 of £68,131, as compared with £60,479 for the previous year. The dividend for the year is 3¼ per cent., tax free (against 3½ per cent., tax free) and £13,988 is carried forward (against £8,121 brought in).

The National Electric Construction Co., Ltd., reports a profit for 1939 of £40,130. The dividend for the year is 10 per cent., and the undivided profits account receives £19,326, making it £129,363.

The Madras Electric Supply Corporation reports a net profit for 1939 of £58,628, as compared with £74,863 for the previous year. The ordinary dividend for the year is 6 per cent., tax free (against 8 per cent.), and £41,611 is carried forward (against £43,724 brought in).

The Sudan Light & Power Co. reports a net profit of £25,827 for 1939 (against £31,753 for 1938). The ordinary dividend is 6 per cent. (same), and £40,820 is carried forward (against £41,233 brought in).

Callender's Cable & Construction Co., Ltd., is paying a final ordinary dividend of 10 per cent., making 15 per cent. for the year (unchanged).

The Electric & General Investment Co., Ltd., has declared a final dividend of 5 per cent., making 7½ per cent. for the year (same). Last year a jubilee bonus of 2½ per cent. was paid.

R. A. Lister & Co. have announced an interim dividend of 5 per cent. (same).

International Combustion, Ltd., has declared an interim dividend of 5 per cent. (against 7½ per cent.).

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares.

New Companies Registered

A. W. Sclater & Son, Ltd.—Private company. Registered June 4th. Capital, £3,000. Objects: To acquire the business of electrical engineers now carried on by F. A. Sclater and T. W. Harris at 15, Savile Row, Burlington Gardens, W., as A. W. Sclater & Son. The permanent directors are: F. A. Sclater, 74, Palace Gardens Terrace, Kensington, W.8, and T. W. Harris, 113, Home Park Road, Wimbledon Park, S.W.19.

Milton Accumulator Co., Ltd.—Private company. Registered June 5th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in electrical accumulators, batteries, acids and containers, &c. The permanent directors are: W. H. A. Butterfield, 12, Fulton Villas, Boundary Road, N.22, and H. A. Walford, 39, Chessington Court, N.3. Registered office: 70a, Basinghall Street, E.C.2.

A. L. Vass, Ltd.—Private company. Registered June 5th. Capital, £1,500. Objects: To carry on the business of electrical engineers and general electrical installation contractors, &c. The directors are: A. L. Vass and Mrs. M. Vass, both of "Fairlea," The Avenue, Meir, Stoke-on-Trent.

Lewis Gas Detector Co., Ltd.—Private company. Registered June 3rd. Capital, £100. Objects: To carry on the business of electrical engineers, general electrical installation contractors, manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, electrical, gas, water and steam plant, &c. The directors are: L. J. A. Lewis (managing director), 42, Victoria Road, Victoria Park, Manchester, 14, and R. Bibby, 291, Bramhall Lane, Davenport, Stockport. Secretary: L. J. A. Lewis. Registered office: 42, Victoria Road, Victoria Park, Manchester, 14.

Companies' Returns

Singapore Traction Co., Ltd.—Capital, £575,000 in £225,000 preference stock and £350,000 ordinary stock. Return dated February 21st, 1940. £225,000 preference stock and £165,909 ordinary stock taken up. £107 paid on £107 ordinary stock, £390,802 considered as paid on the remainder. Mortgages and charges: £166,300.

British Resistor Co., Ltd.—Capital, £16,000 in 15,000 6 per cent. cumulative preference shares of £1 and 20,000 ordinary shares of 1s. Return dated March 25th, 1940. 3,000 preference and 2,222 ordinary shares taken up. £3,111 2s. paid. Mortgages and charges, nil.

Metropolitan-Vickers Electrical Co., Ltd.—Capital, £250,000 in £1 shares. Return dated March 28th, 1940. 10,002 shares taken up. £10,002 paid. Mortgages and charges, nil.

Telegraph Construction & Maintenance Co., Ltd.—Capital, £896,400 in £1 shares. Return dated April 2nd, 1940. 392,175 shares taken up. £186,750 paid, £205,425 considered as paid. Mortgages and charges, nil. A return of allotments, made up to April 9, 1940, shows a further 62,250 shares allotted for cash.

City of Buenos Aires Tramways Co. (1904), Ltd.—Capital, £1,240,000 in £5 shares. Return dated February 27th, 1940. All shares taken up. £1,240,000 paid. Mortgages and charges: £95,564.

Mortgages and Charges

F. W. Thorpe, Ltd.—Charge on land and premises at Hall Green, Birmingham, dated May 21st, 1940, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £5,000.

Watkins and Smith, Ltd.—Mortgage on certain hire-purchase agreements, dated May 30th, 1940, to secure £232 and further advances. Holders: Needham Engineering Co., Ltd., Townhead Street, Sheffield.

Company Liquidations

Charlton Electrical Co., Ltd., 243a, Lewisham High Road, New Cross, and elsewhere.—The first meetings of creditors and shareholders under the compulsory liquidation of this company were held on June 4th at Carey Street, W.C. Mr. J. B. Thompson, Senior Official Receiver, reported that the company was incorporated in August, 1933, to acquire from Mr. S. E. Grubb the business of electrical engineer and contractor carried on by him at East Ham as the Charlton Electrical Co.; at Hornsey Road, Highbury, as the Highbury Electrical Co.; and at Stepney as St. George's Radio Co. The Stepney branch was closed early in 1935 and the New Cross branch was opened in June of that year. Until 1938 both branches showed a profit but the trading accounts disclosed that from July 1st, 1938, to April 8th, 1940, when a voluntary liquidator was appointed, there was a net loss of £8,823. The Highbury branch was closed in November, 1939, and the business was transferred to New Cross. In July, 1939, the company entered into a contract with a local authority for wiring 850 houses at the price of £3,795. When the work was started it became evident that the company was incurring considerable loss. The contract terminated in March last, and it might be that the local authority would have a claim in respect of damages for breach of contract. The statement of affairs showing the position on April 8th, 1940, when the voluntary liquidator was appointed, disclosed total liabilities of £7,708 (unsecured £6,113), assets of £436 after allowing £1,214 for payment of the preferential claims, and an issued capital of £1,000. The failure was attributed to general decrease of turnover following the September, 1938, crisis, a further decrease on the outbreak of war, and heavy losses on the Highbury branch. Mr. L. C. Webber, C.A., was appointed liquidator.

C. H. Gosling, Ltd., electrical engineers, &c., Bolton.—The statutory meeting of creditors was held recently at Bolton, when it was reported that the liabilities amounted to £267 with assets of £92, leaving a deficiency of £175. A resolution was passed confirming the voluntary liquidation of the company with Mr. J. M. Howarth, C.A., Nelson Square, Bolton, as liquidator. A committee of inspection was also appointed.

Lord & Shand, Ltd.—Particulars of claims by July 15th to Mr. F. E. Bendall, liquidator, King Edward House, New Street, Birmingham.

Green Radio, Ltd.—Meetings July 9th at 14, Moorgate, London, E.C.2, to receive an account of the winding-up by the liquidator, Mr. L. C. Webber.

Bankruptcy Proceedings

F. Cresswell, Market Chambers, Mansfield, electrical engineer.—The public examination took place on June 6th at the County Court House, St. Peter's Gate, Nottingham. The statement of affairs showed a deficiency of £960, and debtor attributed his failure to bad trade, and costs in a legal case in connection with a claim for services. The examination was closed.

E. A. V. Burton, electrical engineer, 14, St. Peter's Park Road, Broadstairs.—Last day for receiving proofs for dividend June 15th. Trustee, Mr. F. Wells, 1, The Parade, Canterbury.

H. A. Smith, electrical engineer and contractor and neon sign engineer, 76, Canterbury Street, Gillingham.—Receiving order made May 31st on debtor's own petition.

W. R. Marchant (Marchant & Co.), electrical contractor, 81, Sandgate Road, Folkestone.—Receiving order made May 31st on debtor's own petition. First meeting June 15th at 1, The Parade, Canterbury. Public examination June 25th at the Guildhall, Canterbury.

R. H. Levy, electrician, 29, Roman Road, Linthorpe, Middlesbrough.—Receiving order made May 29th on debtor's own petition. First meeting June 14th at 80, High Street, Stockton-on-Tees. Public examination July 5th at the Court House, Middlesbrough.

W. J. Fishbourne, electrical and mechanical engineer, 7, Tynewydd Terrace, Newbridge, Mon.—Trustee, Mr. R. Betts, 34, Park Place, Cardiff, Official Receiver, released June 4th.

J. C. De Wardt (De Wardt Radio), radio and electrical engineer, 10, Windmill Street, Gravesend.—Last day for receiving proofs for dividend June 21st. Trustee, Mr. A. H. Partridge, 3, Warwick Court, Gray's Inn, London, W.C.1.

F. J. Harrison (C.W.H. Electrical Co.), electrician, Dicconson Street, Wigan.—Receiving order made May 29th on debtor's own petition. Public examination June 27th at the Court House, Wigan.

T. Riley, electrical contractor, The Haven, Boundary Lane, Mossley, Congleton, lately trading at 58, Station Road, Tunstall, Stoke-on-Trent.—Public examination July 9th at the Town Hall, Macclesfield.

H. Way, electrical engineer, 73, Craven Avenue, Lipson, Plymouth. — Public examination July 19th at the Western Law Courts, Plymouth.

Reports and Dividends

Telephone Properties, Ltd., held their annual meeting on June 7th, when Mr. G. Forbes, who presided in the absence of Sir Alexander Roger, said that an increase of 4,744 telephones was reported by the Nacional Company during 1939, a growth of nearly 22 per cent. Since the recovery from the depression period ended December 31st, 1934, the number of telephones in service had increased from 14,165 to 26,624 at December last, or by nearly 90 per cent.

The programme of public works commenced by the Venezuelan Government in 1938 had stimulated building development throughout the country, particularly in the capital city of Caraças, where telephone expansion had been most marked. This had involved the Nacional Company in heavy capital expenditure and increase in its staff. Plant extensions of a total capacity of 2,000 lines were brought into service on Caraças main exchange during 1939. Further extensions to this exchange totalling 2,800 lines were actually on order and they expected to maintain equipment deliveries in spite of the difficulties arising from war restrictions. They had little doubt that the Nacional Company had a further period of expansion and progress in front of it.

Whitehall Electric Investments, Ltd.—At the annual meeting on June 4th the Hon. Clive Pearson (chairman) said that in Greece the outbreak of the war caused a certain dislocation in industrial production. The electricity company's sales, however, had risen by nearly 13 per cent. to more than 188 million kWh. The transport company's results also improved and for the first time in its history the company made a moderate profit. In Spain the Lecrin Company resumed operation in March of last year and the sales for the nine months to December 31st reached 10 million kWh. In the West of England the number of consumers now exceeded 40,000. Sales of electricity, at 23 million kWh, showed an increase of 15 per cent. over the previous year.

The Calcutta Tramways Co., Ltd., held its annual meeting on June 4th when Sir Geoffrey R. Clarke (chairman) said that the takings in the current year showed a substantial increase but were more than offset by increased expenses so that publication of traffic receipts had been discontinued as likely to be misleading.

(Continued on preceding page

STOCKS AND SHARES

TUESDAY EVENING.

THE entry of Italy into the theatre of war brought about a fresh feeling of hesitation in Stock Exchange markets. At the outset of business on Tuesday morning this week, prices generally gave way. Later, as the persistent bargain-hunter went round from one market to another, he disclosed the shortage of stock that still is an outstanding feature, and it was not long before part of the previous decline had been recovered. Nevertheless, there are a good many falls left on the week. The influence of the National Savings Campaign, diverting as it does huge streams of money into British Government securities, exercises an indirectly restraining effect upon Stock Exchange prices and markets.

Southern Railway

After falling heavily for the past three weeks, Home Railway stocks have given faint signs of rallying. The pre-ordinary issues remain flat. Southern Railway 5 per cent. preference at 79¼ is 25 points below its maximum this year. At 80 the yield is 6¼ per cent. on the money, a return which, for a Chancery Trustee security, must be accounted high, even in wartime. Because the Southern Railway is deemed to be especially vulnerable to air attack, the trustee—and the regular investor as well—fight shy of employing money in the purchase of its stocks. Under existing conditions, the railways are equally responsible, according to their agreed proportions, for whatever losses they may sustain outside the Government guarantee, and, in point of fact, Southern preference has depreciated no more this year than Great Western preference. Investment declines to take the risk, and a lack of buyers is a conspicuous feature of the Home Railway market in prior charge stocks.

The Railways' Guarantee

The slightly firmer disposition in the Home Railway group is manifest amongst its junior issues. Here, the Southern Railway preferred 5 per cent. stock has attracted a little buying from the speculative investor who looks at the high yield, and is prepared to take a hazard for the sake of getting 11 per cent. on his money. For some reason, an impression is current that the Government may decide to qualify the agreement made with the railway companies under which the revenues of the controlled undertakings were pooled, and an annual payment of £40 millions was guaranteed by the Government. The payment was to accrue to the five railways concerned, in fixed proportions. On the strength of the arrangement, published as a white paper last February, Home Railway stocks advanced by leaps and bounds. The falls have been equally dramatic. It is now known that the railways will be subject to 100 per cent. E.P.T. How this may affect the value of the guarantee is a matter of such uncertainty that the market is left groping in the dark until the situation shall become clarified by fresh official announcement.

Cable and Wireless

The weakness of the market in Cable and Wireless stocks shows no sign of early conclusion. The ordinary has been changing hands around 40, some 25 points below the price of a few months ago, and offering a yield of 10 per cent.—at 40—on the basis of the last-paid dividend of 4 per cent. The 5½ per cent. preference, standing at practically par earlier this year, is now 82½. Stock Exchange dealers in the market confess their inability to account for the slump on any more definite ground than that of general conditions. It may, of course, be recalled that at the recent meeting the chairman spoke in guarded tones of the outlook, to which the market reply would doubtless be that the fall in prices has allowed generous discount for eventualities.

The chairman's speech, it may also be remembered, stated that it had been found convenient to pay the preference dividend a month later than hitherto, and that the next distribution would be in October instead of September. This has raised the query as to whether the autumn dividend is going to be for seven months instead of six. Proprietors are likely to feel aggrieved if they have to wait a month longer than usual for half-a-year's dividend.

British Electric Traction

This company's deferred stock rose 75 points, to 575, upon withdrawal of dividend limitation. Declaration of the final dividend on the deferred stock is expected to be made at any moment. Cautious opinion has been looking for 15 per cent., to make, with the interim of similar amount, 30 per cent. for the year.

According to the preliminary statement just issued, current profits would provide for a 50 per cent. distribution. The price of the stock picked up from 450 to 500 on the announcement. Profits are shown to have kept up well in the year to March last, although taxation seems likely to bring the net figure rather below last year's. Report has it that the big transport and traction concerns are faring better than might be supposed in view of the restriction of travelling facilities. That this should be so is ascribed to the fact that a considerable part of the services normally run are unprofitable, and that their curtailment often means gains, rather than losses, in net revenue.

Equipment and Manufacturing

Withdrawal of the Limitation of Dividends Bill by the Government was not wholly unexpected, but it had a favourable effect upon prices for no longer than half an hour. By raising E.P.T. to 100 per cent. all round, instead of confining its operation to controlled companies, the Government rendered redundant the dividend limitation proposals of Sir John Simon. The brief spasm of firmness imparted to prices was followed by resumption of heaviness. International Combustion fell 10s. to 90s., General Electric 3s. 9d. to 70s.; Automatic Telephones at 40s. and Lucas at 52s. 6d. have also lost 3s. 9d. Falls of ⅛ lowered Murex to 68s. 9d. Lancashire Dynamo fell ¼ to 52s. 6d., Johnson & Phillips to 37s. 6d., and Telegraph Constructions to 32s. 6d. Various declines of 1s. 3d. are marked in the list of shares in equipment and manufacturing companies. It is not any heavy pressure to sell that has caused the falls; rather, the latter are due to the absence of buying disposition to take shares that come in from deceased accounts and from other sources of what may be termed compulsory realisation.

Electricity Supply Shares

The relapse of 3s. 9d. in Bournemouth & Poole Electric ordinary shares is a reflection of the same sentiment that has caused the slump in Southern Railway stocks. For many months the shares were the firmest in the electricity supply list, but on the development of air-raidmindedness, the price has shed 6s. 3d. in a fortnight. County of London ordinary, the parent of this group, are down to 28s. 9d., a drop of 14s. 6d. from their highest of this year. Richmond Electrics, another under the same ægis, have gone back to 22s. The quotation changes so very rarely as to raise an occasional doubt as to whether it is of sufficient public interest to include it in our price lists. Isle of Thanet shares have dropped 3s., to 9s., thanks to the company's area of operations. Shares changed hands a month ago at 12s. 6d.: it is doubtful whether a seller would be able to get on at 8s. to-day. Midland Counties, City of London and Northmets are amongst other ordinary shares that have given way. In the preferences, no material changes have occurred.

Metropolitan Electric Debenture

For some undisclosed reason, a good many inquiries are reaching the Stock Exchange market as to what is the best course to pursue by holders of Metropolitan Electric 7½ per cent. debenture stock. By the terms of the issue, the stock is definitely repayable at 100 on December 31st, 1941, at latest. The amount now outstanding is about £88,000. In ordinary circumstances, it might be expected that such a stock would form the subject of conversion into a new issue bearing a lower rate of interest and redeemable at some future date. But, under war conditions, conversion is frowned upon by the Treasury, and therefore the stock will no doubt be duly redeemed at 100 next December twelvemonth. This practical certainty gives the stock the character of a gilt-edged "short," and there are substantial buyers at 101. The problem for the proprietor is whether the stock should be held to maturity, or sold now in order that the proceeds may be reinvested in war stocks or other securities. To offer counsel or advice in a general way is obviously impossible. Decision must be governed by the special considerations surrounding each individual case, but the solution of the problem presents unusual difficulties.

Great Northern Telegraph

The Great Northern Telegraph Company of Denmark has notified that the next coupon due for payment on its shares—No. 81—has now no value. Coupon No. 82 is cancelled. The company has a large holding, as mentioned here last month, in British Government securities. The interest on these is hardly likely to be handed over to the company in Copenhagen now that Denmark has become, for all intents and purposes, a German possession. It may be presumed, therefore, that the money will be retained in this country and put into a suspense account during the progress of hostilities.

Shares rarely change hands: the last transaction marked in the Stock Exchange Official List was at 12, on May 29th. According to a venerable rumour, the Danish Royal Family have—or had—part of their fortune invested in the company.

Measuring Rail Movement

AN electrical device for measuring the vertical acceleration of the end of a rail and of a sleeper on railways is described by Mr. J. W. Atwell in the *Journal* of the Royal Technical College, Glasgow.

A pressure detector of the carbon granule type, whose electrical resistance is proportional to the mechanical pressure applied, forms one arm of a balanced Wheatstone bridge circuit. Change of mechanical load disturbs the balance of the bridge, the resulting variation of potential difference being amplified electrically and reproduced on the screen of a cathode-ray oscilloscope in conjunction with a moving-film camera for recording the voltage changes.

Mr. Atwell's research formed part of a major investigation into rail-joint deterioration and the principle involved had previously been employed by Dr. H. H. Davis (Cambridge University thesis) in the measurement of vertical accelerations of a moving wheel.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 Highest	1940 Lowest	Dividend Previous	Dividend Last	Middle Price June 11	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole	63/6	51/3	15	15	51/3	−⅓	5 17 0
British Power and Light	30/-	24/-	7	7	23/-	−1/6	6 1 9
City of London	28/-	22/6	7½	7½	22/-	−1/-	6 16 4
Clyde Valley	38/6	32/-	8	8	32/6	...	4 12 4
County of London	43/3	28/6	10½	10½	28/9	−¼	7 6 0
Edmundson's:							
7% Pref.	31/6	28/-	7	7	31/3	...	4 9 7
Ord.	27/6	20/-	9	6	21/-	...	5 14 3
Elec. Dis. Yorkshire	40/3	35/-	9	9	34/6	−6d.	5 4 4
Elec. Fin. and Securities	41/3	38/6	12½	12½	38/9	...	6 9 0
Elec. Supply Corporation	46/3	41/-	12	11½	42/6	...	5 8 3
Isle of Thanet	16/-	9/-	4	4	9/-	−3/-	8 17 10
Lancs Light and Power	33/-	27/6	7½	7½	27/6	...	5 9 0
Llanelly Elec.	21/-	19/6	5½	5½	20/6	...	5 7 4
Lond. Assoc. Electric	21/-	16/-	7	5½	16/3	...	6 15 4
London Electric	37/6	22/-	8	7½	22/6	−½	6 9 0
London Power Deb. Red.	105½	103	5	5	104½	...	4 15 6
Metropolitan	41/6	28/-	12	10	28/9	−¼	6 19 2
Midland Counties	39/-	31/-	8	8	31/3	...	5 2 5
Mid. Elec. Power	40/-	35/-	8	9	35/-	−⅛	5 2 10
Newcastle Elec.	29/9	26/-	7	7	26/3	...	5 6 8
North Eastern Electric:							
Ordinary	31/6	22/-	7	7	22/6	−2/-	6 4 5
7% Pref.	32/6	29/6	7	7	29/6	...	4 15 0
Northampton	48/-	41/-	10	10	42/6	...	4 14 1
Notting Hill 6% Pref. (£10)	10⅞	10	6	6	10⅞	...	—
Northmet Power:							
Ordinary	42/3	30/-	10	10	30/-	−9d.	6 13 4
6% Pref.	29/-	26/9	6	6	27/6	...	4 7 3
Richmond Elec.	24/6	22/-	7	6	22/-	−¼	5 9 1
Scottish Power	38/-	30/-	8	8	30/-	...	5 6 8
Southern Areas	21/3	17/-	5	5	17/-	...	5 17 8
South London	23/3	22/-	7	7	21/3	−9d.	6 11 9
West Devon	20/-	18/6	5	5	20/-	...	5 0 0
West Glos.	21/3	16/6	2½	4½	18/9	−¼	4 16 0
Yorkshire Elec.	40/-	31/6	8	8	32/-	...	5 0 0
Overseas Electricity Companies							
Atlas Elec.	4/-	2/-	Nil	Nil	2/-	...	—
Calcutta Elec.	37/-	27/-	10*	8*	27/-	−½	5 18 6
Cawnpore Elec.	30/-	26/3	10	10	26/3	−½	7 12 4
East African Power	25/6	23/3	7	7	24/6	−6d.	5 14 3
Jerusalem Elec.	24/-	21/6	7	7	22/6	−6d.	6 4 5
Kalgoorlie (10/-)	12/6	9/6	7½	7	11/6	−6d.	6 1 9
Madras	26/9	25/-	8*	8*	25/-	−⅛	—
Montreal Power	35½	30	1½	1½	31	−½	—
Palestine Elec. "A"	25/-	21/-	7½*	5*	21/3	...	4 14 1
Perak Hydro-electric	20/3	14/6	6	2½	14/6	...	3 9 0
Shawinigan Power	27½	20	83cts.	90cts.	19½	−½	—
Tokyo Elec. 6%	69	54	6	6	54½	−3	11 0 2
Victoria Falls Power	75/9	65/-	12½	15	65/-	−¼	4 12 4
Whitehall Investments Pref.	17/9	11/6	7½	7½	13/-	+1/-	11 10 0
Public Boards							
Central Electricity:							
1950–70	110½	106	5	5	106½	...	4 14 0
1955–75	112½	106	5	5	106½	+½	4 14 0
1951–73	107½	102	4½	4½	102½	...	4 7 10
1963–93	96½	90	3½	3½	92½	...	3 15 8
London Elec. Trans Gtd.	92	87½	2½	2½	91½	+½	2 14 8
London & Home Counties							
1955–75	113½	105	4½	4½	105½	...	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	105	...	4 5 9
B	116	103	5	5	104½	...	4 15 8
C	65½	31½	1½	—	32½	−3	—
West Midland Joint Elec., 1948–68	106½	105	5	5	106½	...	4 14 0
Telegraph and Telephone							
American Tel. & Tel.	215	180	9	9	180	...	5 0 0
Anglo-Am. Tel.:							
Pref.	106	93½	6	6	98½	...	6 1 10
Def.	23⅜	21	1½	1½	21½	...	6 19 6
Anglo-Portuguese	22/6	19/6	8	8	20/-	...	8 0 0
Cable & Wireless:							
5½% Pref.	99½	82	4½	5½	82½	−5	6 13 4
Ord.	65	39	4	4	40½	−4	9 17 6
Income	99½	93	—	—	98½	...	4 1 5
Canadian Marconi $1	6/-	4/-	Nil	4cts.	4/3	−9d.	—
Globe Tel. & Tel.:							
Ord.	32/6	28/-	7½*	7½*	30/-	−½	5 0 0
Pref.	28/9	24/6	6	6	25/-	−⅛	4 16 0
Great Northern Tel. (£10)	20	11	20	20	12½	−½	—
Inter. Tel. & Tel.	5½	3	Nil	Nil	3	...	—
Marconi-Marine	30/-	20/-	10	7½	20/-	−⅛	7 10 0
Oriental Telephone Ord.	2¾	53/6	12*	11½*	2¾	...	4 3 8
Telephone Props.	15/-	12/6	5	6	12/6	...	9 12 0
Telephone Rentals (5/-)	9/6	7/-	10	10	7/-	−6d.	7 2 10
Traction and Transport							
Anglo-Arg. Trams:							
First Pref. (£5)	4/3	3/0	Nil	Nil	3/-	...	—
4% Inc.	11½	4	Nil	Nil	5½	...	—
British Electric Traction:							
Def. Ord.	830	450	5	5	575	+75	—
Pref. Ord.	169	147	8	8	165	...	4 17 9
Bristol Trams	48/6	40/-	10	8*	41/3	+⅛	3 17 5
Brazil Traction	12½	6	$1	50c.	6½	−⅜	—
Calcutta Trams	24/-	20/-	8	8	20/-	...	8 0 0
Cape Elec. Trams	18/6	16/-	5	5	18/-	−½	5 11 1
Lancs Transport	35/-	28/3	10	10	35/-	...	5 14 8
Mexican Light:							
1st Bonds	33	27	5	5	30½	...	—
Rio 5% Bonds	90	74	5	5	80	...	6 5 0
Southern Rly.:							
5% Prefd.	79	42	5	5	44	+1½	11 7 4
5% Pref.	104½	77½	5	5	79½	−3	6 5 9
T. Tilling	45/9	32/6	10	10	33/3	−6d.	6 0 4
Tilling & B.A.	47/6	43/9	9*	8*	47/6	...	3 7 10
West Riding	35/-	28/6	10	10	32/-	...	6 5 0
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	15/-	15	15	17/6	...	—
Assoc. Elec.:							
Ord.	43/3	35/6	10	10	36/3	−⅛	5 10 4
Pref.	35/3	32/3	8	8	35/-	...	4 11 5
Automatic Telephone & El.	47/3	40/-	12½	12½	40/-	−⅛	6 5 0
Babcock & Wilcox	50/-	37/6	10	11	37/6	...	5 17 5
British Aluminium Ord.	56/-	43/6	12½	12½	43/9	...	5 14 3
British Insulated Ord.	92/6	78/-	20	20	78/9	...	5 1 6
British Thermostat (5/-)	14/9	11/9	18½	18½	12/6	...	7 8 0
British Vacuum Cleaner (5/-)	12/6	8/6	40	12½	10/-	...	6 5 0
Brush Ord.	4/6	2/6	Nil	Nil	3/3	...	—
Callender's	69/-	57/-	20	15	55/-xd.	−1/-	5 9 1
Chloride Elec. Storage	72/6	67/-	20	15	3¾xd.	−1/-	4 9 0
Consolidated Signal	72/6	59/-	36½	17	3¾	...	4 13 10
Crabtree (10/-)	24/9	20/6	17½	17½	21/3	...	8 4 9
Crompton Parkinson:							
Ord. (5/-)	20/-	13/6	15	20	13/9	...	7 5 6
E. K. Cole (5/-)	5/-	3/3	10	Nil	4/-	...	—
Elec. & Musical Industries (10/-)	10/3	5/6	5	Nil	6/3	+3d.	—
Electric Construction	36/3	32/6	12½	13½	35/-	...	7 14 2
Enfield Cable Ord.	56/-	46/3	25	16½	48/9	...	6 13 2
Electrical Switchgear (10/-)	22/6	20/-	16	10	20/-	...	5 0 0
English Electric	33/9	24/-	10	10	25/-	−⅛	8 0 0
Ensign Lamps (5/-)	15/3	13/9	25	25	13/9	...	9 1 10
Ericsson Tel. (5/-)	39/3	30/-	25*	25*	30/-	...	4 3 4
Ever Ready (5/-)	28/3	20/3	30	40	20/6	...	9 15 2
Falk Stadelmann	18/3	17/6	10	6	17/6	...	6 17 4
Ferranti Pref.	25/-	23/-	7	7	25/-	...	5 12 0
G.E.C.:							
Pref.	32/6	28/-	6½	6½	29/6	...	4 8 3
Ord.	83/3	69/6	17½	20	70/-	−⅝	5 14 3
Greenwood & Batley	25/6	21/3	15	15	22/6	−⅛	13 6 8
Hall Telephone (10/-)	18/6	15/-	15	10	15/-	...	6 13 4
Henley's (5/-)	21/6	16/3	20	20	16/3	...	6 3 1
4½% Pref.	21/3	20/6	4½	4½	21/3	...	4 4 8
Hopkinsons	46/9	40/-	12½	15	40/-	...	7 10 0
India-Rubber Pref.	21/-	20/-	5½	5½	20/9	...	5 6 0
Intl. Combustion	121/3	90/-	32½	32½	4½	−½	7 4 5
J. Lucas	60/6	52/3	15	15	52/6	−⅞	5 14 3
Johnson & Phillips	50/9	37/6	12½	15	37/6	−½	8 0 0
Lancashire Dynamo	59/9	52/6	25	20	52/6	−½	7 12 6
Laurence Scott (5/-)	11/-	9/3	15	15	9/6	...	8 0 0
London Elec. Wire	25/6	25/-	12	7½	25/-	...	6 0 0
Mather & Platt	46/6	36/3	13½	10	36/3	−⅛	5 10 4
Metropolitan Elec. Cable Pf.	22/-	21/3	5½	5½	21/3xd.	...	5 3 6
Murex	86/9	67/-	20	20	68/9	−⅛	5 16 3
Pye Deferred (5/-)	9/-	7/-	25	25	9/-	...	13 17 9
Revo (10/-)	20/9	16/3	17½	17½	16/3	−⅛	10 15 4
Reyrolle	60/6	48/9	12½	12½	48/9	−⅛	5 2 6
Siemens Ord.	23/9	17/3	7½	7½	17/6	...	8 11 6
Strand Elec. (5/-)	2/3	1/-	10	4	1/3	−9d.	10 0 0
S. Smith (1/-)	8/-	5/-	37½	50	5/-	−⅛	10 0 0
Switchgear & Cowans (5/-)	11/9	7/6	20	10	10/-	...	5 0 0
Telegraph Condenser (10/-)	8/9	6/3	5	—	8/9	...	—
Telegraph Construction	42/6	32/6	10	10	32/6	−½	6 3 1
Telephone Mfg. (5/-)	9/-	7/-	9	9	7/-	—	6 8 7
Tube Investments	96/9	76/3	23¾	23¾	77/6	−½	6 3 0
Vactric (5/-)	3/6	2/-	4	Nil	2/9	−3d.	—
Vickers (10/-)	22/-	12/-	10	10	12/6	+3d.	8 0 0
Ward & Goldstone (5/-)	19/9	19/3	20	20	19/9	...	5 1 3
Westinghouse Brake	46/-	32/9	17½	10	40/-	...	5 0 0
Walsall Conduits (4/-)	26/6	23/9	55	55	23/9	...	9 5 2
West, Allen (5/-)	7/-	5/-	10	7½	5/-	...	7 10 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Australia.—MELBOURNE.—June 25th. State Electricity Commission of Victoria. Cable. (T. 19609/40.)*

General service AC kWh meters for twelve months. (T. 19859/40.)*

July 23rd. Voltage regulating equipment. (T. 19531/40.)*

June 18th. Posts and Telegraphs Department. July 4th. Trunk type cable. (T. 19216/40.)*

July 16th. Underground cable. (T. 19853/40.)*

August 6th. Transformers for Kiewa No. 3 power station. (T. 19912/40.)*

Barking. — June 28th. Corporation. Electrical work at first-aid post and control centre, new Town Hall. (June 7th.)

Birmingham.—July 3rd. Electric Supply Department. AC and DC distribution boards. (See this issue.)

Brighouse.—June 15th. Electricity Department. One 350-kVA transformer. (June 7th.)

Bristol.—June 17th. Electricity Department. Cables, flexibles, &c. (See this issue.)

Burnley.—June 17th. Corporation. Extra-high-voltage switchgear and cables. (May 31st.)

Bury.—June 17th. Electricity Department. Supply, delivery, laying and jointing of 11-kV cable; one 5,000-kVA transformer. (May 31st.)

Dublin.—June 17th. Town Council. (a) Public lighting requirements (time controllers, time switches and street lanterns); and (b) electrically driven centrifugal pump with motor. Form of tender for (a) from the Housing and Supplies Department, Exchange Buildings, Lord Edward Street, and for (b) from the office of the city engineer, 28, Castle Street. Tenders to P. J. Hernon, town clerk.

Heywood.—June 17th. Electricity Department. Supply, delivery, laying and jointing of 11-kV cables, supply and connecting up one 5,000-kVA transformer, and 11- and 66-kV switchgear. (May 31st.)

Newark-on-Trent.—June 15th. Electricity Department. 11-kV metal-clad ring main unit and a 50-kVA transformer. (May 24th.)

New Zealand.—WELLINGTON.—June 25th. Public Works Department. Suspension insulators. (T. 19809/40.)*

Sleaford.—June 26th. Electricity Department. One 50-kW mercury arc rectifier. (See this issue.)

South Africa.—JOHANNESBURG.—City Council. July 10th. Ten l.v. switchboards. (T. 19395/40.)*

Ten 250-MVA and fourteen 150-MVA, triple-pole, oil-immersed circuit-breakers for use on a 6,600-V, 50-cycle system. (T. 20003/40.)* Box-type distribution fuse units. (T. 20005/40.)*

Distribution transformers. (T. 19831/40.)*

July 11th. Public Works Department. Electric lift at the new Police Mortuary, Johannesburg. (T. 20009/40.)*

July 15th. Railways and Harbour Administration. Electrical equipment, comprising high-speed circuit-breakers, isolating links, insulators, &c., and battery charging equipment. (T. 19785/40.)*

CAPE TOWN.—July 3rd. Electricity Department. Secondary battery and battery charging equipment. (T. 19635/40.)*

SALISBURY (SOUTHERN RHODESIA).—July 15th. Electricity Department. Electrical distribution materials. (T. 19595/40.)*

Taunton.—Corporation Waterworks. Second-hand pumps, comprising one or two electrically driven pumping sets, each capable of delivering not less than 20,000 or more than 30,000 gal. per hour against a total head of 300 ft. Sets must be designed for operation on three-phase, 50-cycle, 400 V supplies. Tenders, with particulars, to Rofe & Raffety, 42, Salisbury Avenue, Cheam, Surrey.

Wolverhampton.—July 2nd. West Midlands J.E.A. Transmission line and cables and 11-kV distribution switchgear. (See this issue.)

Workington.—June 24th. Electricity Supply Department. Two 300-kVA transformers. (See this issue.)

Orders Placed

Erith.—Town Council. Accepted. Cables, cable covers, joint boxes and feeder pillars, and cable laying, for twelve months.—Callender's.

Gloucester.—Town Council. Accepted. Electrical services in the operating theatre and boiler house extension at the City General Hospital (£508).—Colston Electrical Co.

Glasgow.—Electricity Committee. Accepted. Annual stores and other plant: Meters.—Aron Electricity Meter; Electrical Apparatus Co.; Measurement; Sangamo Weston; Metropolitan-Vickers Electrical Co.; English Electric Co. Insulating tapes. — British Insulated Cables; Henley's; Micanite & Insulators; City Textile Co.; Jas. North Hardy & Son. 800-kVA transformers. — Bruce Peebles & Co. (eight), £4,340; British Electrical Transformer Co. (four), £2,170. 400-kVA transformers.—Bruce Peebles & Co. (ten), £2,982; British Electrical Transformer Co. (six), £1,789. Thermal storage water heaters and circulators.—Archibald Low & Sons.

Transport Committee. Accepted. Charging plant for bus batteries.—London Transformer Products.

Streets and Buildings Committee. Accepted. Alterations to lifts.—A. & P. Steven, Ltd. (£58); Glasgow Engineers, Ltd. (£525).

Heston and Isleworth.—Town Council. Accepted. E.h.v. oil-immersed circuit-breaker with current transformers, &c. (£1,350).—Switchgear & Equipment.

Luton.—Town Council. Accepted. Three 7,500-kVA transformers (£10,530).—Hackbridge Electric Construction Co.

Leeds.—Transport Committee. Accepted. Twenty omnibus battery sets (£688).—R. F. Winder.

Gas Committee. Accepted. Electric motor and booster at gasworks (£564).—Bryan Donkin Co.

Electricity Committee. Accepted. High-voltage substation switchgear £1,360). — Yorkshire Switchgear & Engineering Co. Low-voltage substation switchgear (£1,025).—G.E.C. Transformers (£2,352).—Electric Construction Co. Cables: Hackbridge Cable Co. (£358 and £214); Edison Swan Cables (£238); Crompton Parkinson (£101).

Manchester. — Corporation. Accepted subject to the consent of the Electricity Commissioners to the necessary borrowing powers. New 33-kV transmission cable from Barton power station to Benchill substation. Cable.—Callender's. Switchgear, Barton station.—B.T.M. Co. Switchgear, Benchill substation.—Ferguson, Pailin.

Electricity Committee. Accepted. Requirements during the twelve months ending June 30th, 1941:—Static transformers.—Ferranti. Electric kettles.—Premier Electric Heaters. House-service cut-outs.—Parmiter, Hope & Sugden; Siemens Electric Lamps & Supplies. AC meters.—Ferranti; Metropolitan-Vickers Electrical Co. AC motors.—Electric Construction Co.; Laurence, Scott & Electromotors; B.T.H. Co.

The following are placed on the list of contractors for the department's requirements of cable during the twelve months ending June 30th, 1941:—Britannic Electric Cable & Construction Co.; Aberdare Cables; Scottish Cables; Lancashire Cables; W. T. Glover & Co.; Standard Telephones & Cables; Wholesale Fittings Co.; L. Andrew & Co.; Hackbridge Cable Co.; City Incandescent Light Co.; B.I. Cables; Pirelli-General Cable Works.

Replacement of plates of air heaters. Barton power station.—James Howden & Co. (Land). Cables, Stuart Street power station.—Siemens Bros. & Co.; Connolly's (Blackley); Lancashire Cables; Britannic Electric Cable & Construction Co. Seven 30-Ah batteries for distribution substations.—Britannia Batteries. One 50-kW mercury arc rectifier.—Hewittic Electric Co.

Central Purchasing Committee. Accepted. Electric lamps.—Downes & Davies; Brown Bros.; Baxendale & Co.; Berry's Electric; Hobday Bros.; Hirst, Ibbetson & Taylor; Wholesale Fittings Co.; Z Electric Lamp & Supplies Co.; Electrical Components; F. Hulme & Co.; Underwood (Electric); Samuel Gratrix; Drake & Gorham; Richard Johnson, Clapham & Morris; Albert Taylor (Manchester); J. C. White & Co.; W. E. Beardsall & Co.; E. Hammond & Co.; Auto Electric; Sloan Electrical Co.; Falk, Stadelmann & Co.; Harold Akroyd; Thorn Electrical Industries; Ensign Lamps; Stearn Electric Co.; Walsall Conduits.

Portsmouth.—Electricity Committee. Recommended. 1,500-kW voltage regulator (£800).—Ferranti. (The lowest tender was £498 and the highest £2,450.)

Swindon.—Electricity Committee. Accepted. Two 7,500-kVA transformers (£9,300).—Hackbridge Electric Construction Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ayr.—Shelters (£3,360); burgh surveyor.

Barking.—Factory extensions, Wakering Road; H. Browne & Son, Ltd.

Birmingham.—Shelters for 900 children at Billesley School and for 700 children at Hastings Road Council School; Morris Jacombs & Sons, Ltd., Birmingham.

The Education Committee has instructed the heating and lighting engineer for the proposed Colleges for Technical Art and Commercial Education to complete the plans up to the stage at which tenders may be invited, so that tenders may be obtained when the way is clear for operations to proceed. Cost of the complete scheme is £1,000,000.

Birstall.—Church of St. Teresa, Wanlip Lane, for the Rev. D. Horgan, Ratcliffe College, Leicester; Harlow Bros., contractors, Long Whatton, Hathern, near Loughborough.

Blackburn.—Domestic and commercial shelters (£12,600) for Town Council.

Bootle. — Extensions to factory for Merseyside Food Products, Ltd., Marsh Lane; A. Neville Holt, architect, Imperial Buildings, Exchange Street East.

Bury.—New works and alterations to existing premises for Spencer & Curedale, Ltd., Bury Grounds, Bury; Thompson & Bierley, Ltd., contractors, Union Saw Mills, Bury.

Cardiff.—Air-raid shelters (11); education architect, City Hall. Shelters (53); city engineer.

Carlisle.—Cold store, Berlin Street; W. D. Mark & Sons, Ltd.

Dance hall, Botchergate; Benwell & Slack.

Chesterfield.—Abattoir extensions (£5,000); E. G. Kington, architect.

Chorley. — Public air-raid shelters (£40,000); H. D. S. Lowe, borough surveyor.

Coventry. — Guild House, Sherborne

Street (£32,717), and housing scheme (56 acres), Cheylesmore estate; city engineer.

Cumberland.—Extensions, Cumberland Infirmary, Carlisle; J. & R. Bell, Ltd., contractors, Nelson Street, Carlisle.

Dudley.—Cleansing station and A.R.P. depôt, Brewery Street; borough engineer.

Dundee. — Potato processing factory, Stannergate; Farmers Marketing & Supply Co., Ltd.

Enfield.—Additions, Olympic Varnish Works, Stockingswater Lane; L. Farmer & Co.

Coach building works, Southbury Road; James Neilson.

Esher.—Annexe, Council Offices; surveyor, Council Offices, High Street, Esher.

Flintshire.—Shelters at 12 schools; R. G. Whitley, county architect, County Buildings, Mold.

Gateshead-on-Tyne. — Shelters and refuge accommodation at schools; R. M. Chamberlain, Team Valley Estate, Gateshead, and Sutton & Son, Tinn Street, Gateshead.

Twenty-seven timberless houses on the Highfield estate for the North-Eastern Housing Association; F. H. Patterson, architect, Municipal Buildings, Gateshead.

Glasgow.—Decontamination and first-aid rooms; Harland & Wolff, Ltd.

Extensions, motor works; Albion Motors, Ltd.

Alterations, St. Rollox works (£3,942); Hunter & Clark, Ltd.

Extensions to works for Sandeman Bros., Ltd., Rackett Works, Possil.

Halesowen.—Premises for the Birmingham Municipal Bank Committee; H. Dare & Sons, Ltd., Alum Rock Road, Birmingham.

Extensions to offices at Excelsior Works, Yew Tree Lane, Blackheath, for Thomas William Lench, Ltd.; J. Harper & Sons (Blackheath), Ltd., contractors, Beeches Road, Blackheath, Birmingham.

Halesworth.—Shelters at Arboretum, Mayfield and Maltings, for U.D.C.; surveyor, Council Offices.

Hastings.—Development, Gate Quarry, Fairlight Road; G. R. MacFarlane.

Hebburn-on-Tyne. — Further public shelters for the U.D.C. to accommodate 1,000 people; acting surveyor.

Hinckley.—Works additions, Lancaster Road, for Percy Taylor, Ltd., Lancaster Road; Heaton & Walker, architects, Barclay Bank Chambers, Hinckley.

Honiton.—Fire station scheme, site of old cinema; town clerk, Queen's House, Honiton.

Huddersfield. — Hotel, Bracken Hall estate, Sheepbridge, for Bentley & Shaw, Ltd., Lockwood; Samuel Johnson & Son (Mirfield), Ltd., Newgate, Mirfield.

Ilkeston.—Extensions to textile factory, Cotmanhay Road; G. Beardesley & Co., Ltd.

Jarrow-on-Tyne. — Nine air-raid shelters; J. S. Weir, borough engineer, Town Hall, Jarrow. Also public basement shelter at Piper's Bazaar, Ormonde Street; J. M. Black, Junr., Grange Road West, Jarrow.

Auxiliary fire station (£3,503); J. S. Weir.

Keighley.—Offices, &c., Pitt Street; Dean, Smith & Grace, Ltd.

Kendal.—Junior mixed and infants' school, Haverback Close; G. German, borough engineer and surveyor, Town Hall.

Kettering.—Factory for Wallis & Linnell, Ltd., School Lane.

Additions to works, Dryland Street, for Dalkeith Shoes, Ltd., Dalkeith Place.

Works, Cambridge Street, for A. S. Felton, 83, Kingsley Avenue.

Lanarkshire.—Additions, Clyde Paper Mill, Rutherglen; Clyde Paper Mill Co.

Additions, East Kilbride; Rutherglen Co-operative Society, Ltd.

Lancashire.—Dairy and pasteurising plant, extensions to male staff quarters and occupational therapy extensions at County Mental Hospital; S. Wilkinson, county architect, County Offices, Preston.

Branch Library, Knowsley; county architect.

Leeds.—Self-contained emergency hospital; city architect.

Leicester. — Fire station, Blackbird Road (£20,000); M. W. Pike (Symington, Prince & Pike), architect, 1, West Street, Leicester.

Liverpool.—Church of St. Aloysius, Twig Lane, Roby, for Rev. Michael O'Sullivan; R. V. Smith, architect, 51, Hamilton Square, Birkenhead.

Extensions for Hutchinson & Pollock, Ropery Works, Lodge Lane; E. E. Evans, architect, Abbey Road, West Kirby.

London.—ACTON.—Additions, Factory 164, off Western Avenue, for Nordac, Ltd.; H. J. Hewlett, surveyor, Melcombe Street, Baker Street, N.W.1.

ISLINGTON. — Substations, Sotherby Road, Highbury, and Lady Margaret Road, Holloway; E. C. P. Monson, architect, Finsbury Pavement House, 120, Moorgate, E.C.2.

LEWISHAM. — Laundry, 49, Dalmain Road; Humphreys, Skitt & Co., 271, Greenwich High Road, S.E.10.

Maidenhead.—Extensions to factory for St. Martin Preserving Co., Cornwallis estate.

Manchester.—Cinema on site of the Princes Theatre, for Associated British Cinemas, Ltd., 30, Golden Square, London, W.1; W. Pearson & Son, contractors, Stranton, West Hartlepool, Co. Durham.

Additions to offices, Gorton Lane; H. Matthews & Sons (Builders), Ltd., 129, Stockport Road, Ardwick, Manchester.

Additions to factory, 4, Temple Street, for Knibbs, Ltd.; H. Matthews & Sons.

Additions to factory, Harper Road, Northenden, for G.P.A. Tools & Gauges, Ltd., Derby Street, Cheetham; Matley, Brotherton and Mills, architects, 39, Oxford Street, Manchester.

Adaptation of Sharston Hall, Northenden, as police department; Works Department, Manchester Corporation.

Mansfield. — Central kitchen; W. Thompson, engineer, Carr Bank, Mansfield.

Martley.—Pumping station, Rushwick, for R.D.C.; Willcox, Raikes and Marshall, engineers, 33, Great Charles Street, Birmingham, 3.

Milford Haven.—Houses, Glebelands site (£20,000), for U.D.C.; surveyor, Council Offices.

Nelson.—Warehouse, Yorkshire Street, for Wesley Clegg, Ltd., 8, Hibson Road; R. Jaques, architect, 3, Carr Road, Nelson.

Northampton. — Private substation, Craven Street; Church & Co., Ltd.

Northumberland.—Conversion of Ashington Welfare Institute into a mining technical school; A. Cheyne, County Council Offices, Mitford Road, Morpeth.

Nuneaton.—Public shelters, Stockenford Recreation Ground; borough engineer.

Oldham.—Works additions, Woodstock Mills; H. Matthews & Sons (Builders), Ltd., 129, Stockport Road, Ardwick, Manchester, 12.

Oswaldtwistle.—Works, Bent Street, for J. Read.

Oxford.—Geology department, Parks Road, for University Museum; Lanchester, Lodge and Davis, architects, Bedford Square, London, W.C.1.

Penarth.—Air-raid shelters (1,000); Engineer and Surveyor's Office, 13, Victoria Road, Penarth.

Portsmouth.—Printing works, Spring Street, Landport; G. H. Shepherd.

Redditch.—Houses (80), Batchley Road and Ashtree Road, for the U.D.C.; surveyor to the Council, Council House, Redditch.

Rhondda. — Water turbine house, chemical house, filter house, reservoir, &c., at Tynywaun, Treherbert, for U.D.C.; Thomas & Morgan & Partners, engineers, 23, Gelliwastad Road, Pontypridd.

Romford.—Public shelters at Rex Cinema, Brewery, South Street, Redriffe Road, and Regarth Avenue; borough engineer, Romford Town Hall.

Rowley Regis.—Shelters on 20 sites within the borough; borough surveyor, Municipal Buildings, Old Hill, Staffs.

Roxburgh.—Shelters (£4,000), various county areas, for C.C.; county architect, Newtown, St. Boswells.

Sacriston (Co. Durham).—Cleansing station for C.C.; county surveyor, 43, Old Elvet, Durham.

Sheffield.—Extensions to works for die-sinking shops, Bold Street and Janson Street, and works extensions, Brightside Lane, for English Steel Corporation, Ltd.

Works additions and air-raid shelter, Edith Lane and Robert Street, for R.E.P. Engineering Co., 48, Roberts Street, Owlerton, Sheffield, 6.

New works, Upper Hanover Street, for Richard Bros. & Sons, Ltd., 198, Broomhall Street, Sheffield, 3.

Factory, Spring Street and Bower Street; W. L. Marrison, Ltd.

Works additions, Bernard Lane; Davis Turnbull & Co.

Shelter, Pond Street bus station (£2,200); Knowles & Son, Ltd.

Smethwick.—Factory extension, Rolfe Street; A. E. Griffiths, Ltd.

Works additions, Brasshouse Lane; District Iron & Steel Co., Ltd.

Factory extensions, Rolfe Street; Trewhelle Bros., Ltd.

South Shields. — Works extensions, Middle Dock and Engineering Co., Ltd.

Stockton-on-Tees.—Completion of Newham Grange Maternity Home for the T.C.; Lane, Fox & Co., Ltd., builders, Norton Road, Stockton.

Stoke-on-Trent.—Extensions to Hanley fire station (£4,270); city engineer.

Stratford-on-Avon.—Fire station; borough engineer.

Swadlincote.—Shelters at Town Hall, Old Tramway Depôt, Common Road, Church Gresley, and Newhall; U.D.C. surveyor, Council Offices, Town Hall.

Wallsend.—Rebuilding of laundry after fire for Co-operative Laundries, Ltd.; C.W.S. Architects' Department, 90, Westmorland Road, Newcastle-on-Tyne.

Houses for T.C.; borough engineer.

Walsingham.—Houses (88), for R.D.C.; surveyor, Council Offices, Fakenham, Norfolk.

Washington (Co. DURHAM). — A.F.S. station for the U.D.C.; N. R. Stokoe, builder, Elliott Terrace, Washington.

Wednesbury.—Inn, Union Street and Upper High Street, for Ansell's Brewery Co., Ltd., Aston Brewery, Birmingham; Jeffries and Shipley, architects, Kingscourt, Bridge Street, Walsall.

Willesden.—Extensions to factory for A. Luson & Sons, Standard Road; A. Hosken, architect, Rydal House, Windmill Hill, Ruislip.

Windsor.—Conversion of "Bowden," Sunninghill, to Council offices; R.D.C. surveyor.

Woking.—Extensions to Woking and District Victoria Hospital.

Wolverhampton.—Completion of junior block at Warstones Road School, and proposed senior school, Busbury; borough engineer.

Yorkshire.—NORTH RIDING.—Shelters, Marske Zetland Church of England School and New Marske Council School for the C.C. (£1,500); county architect, Northallerton.

New boiler house and laundry and additions to kitchen block at Guisborough Institution; county architect.

Trade Mark Applications

AMONG recent applications for British trade marks are the following, objections against any of which may be entered within one month from June 5th :—

Klox. No. 610738. Class 11 (IV). Portable electric lamps, torches and pocket flash lamps.—Gemma, Ltd., 9, Cavendish Square, London, W.1.

Kallomax. No. 609953. Class 17 (IV). Gutta-percha, indiarubber, balata and substitutes, and articles made from these substances, &c.—I.C.I. (Plastics), Ltd., Wexham Road, Slough, Bucks.